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Electrology and Radiology.

No. 1. JANUARY, 1906. Vol. VII.

EDITORIAL.

Reviewing the work of the past year we find a general tendency to place electrotherapeutic treatment on a more scientific basis. As regards the use of X-rays we have had brought forward several types of instruments for measuring the current through the tube and thus leading to accuracy of dosage. Of these instruments the most important are the milliampèremeter and the oscillograph. The former seemed very disappointing in its results until Dr. Lewis Jones published his experiments; using the multiple of the alternative spark gap of the tube (which should not be less than 1½ inches) and the reading of the milliampèremeter, we get a very reliable index of the output of X-rays. The oscillograph, which was discussed in a paper by Dr. Morton in our last issue, is exceedingly interesting and appears to have a great future before it.

Much work has been done on the pathological effects of the rays emitted by an X-ray tube, and much has been written on their temporary or permanent action on the generative organs.

With regard to cancer, we stand much in the same position as last year. Surgeons, however, are daily recognising the benefit of raying patients as soon as possible after operation, with the idea of preventing recurrence, and though this method has not been adopted sufficiently long to obtain very useful statistics, the results are distinctly promising.

The treatment of ringworm has occupied much attention; the general opinion in England being somewhat against the use of Sabouraud's pastille as it varies in its effects with atmospheric conditions and the amount of heat produced in the tube, as well as amount of exposure to daylight. Excellent effects are, however, being obtained by the use of a tube with regulated vacuum and the passage of a current of uniformly regulated strength. It seems necessary to find the requisite factors experimentally with every different set of apparatus.

In the domain of electrical treatment there seems to be little that is really new. The use of the constant and interrupted currents of low potential seems to be returning to

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favour in the treatment of many diseases which a year ago were referred for "high frequency." More attention is being paid to the ana- and cataphoretic effects of the galvanic current, and it is stated by some that similar effects can be produced with high frequency currents.

Unqualified practice is still our greatest enemy; but we are glad to note indications that physicians and surgeons generally are finding out that their patients are more likely to benefit under the care of a professional brother than under that of an ex-barman.

* * *

We regret to announce the resignation of our American Editor, Dr. Margaret A. Cleaves, and take this opportunity of thanking her for the valuable contributions she has from time to time made to our Journal. A paper by Dr. Cleaves appears in this issue.

Radiotherapy of Ringworm.—Oram treats his patients four times a week. He has two masks made of fine-meshed wire gauze and covered with lead foil. In one of these the openings are back and front, while in the other they are at the sides. These masks are used on the alternate days, Monday and Thursday, Tuesday and Friday. In this way each area receives two exposures weekly of ten minutes' duration. By the end of the third week the scalp begins to show some erythema. The hair has as a rule entirely fallen off by the end of the fourth week, leaving the scalp bare and free from fungus. As to the position of the tube, the anti-cathode must be placed directly opposite the area to be treated, so that the rays fall perpendicularly on the skin. The tube must be placed not less than 6 inches from the skin. Oram uses 3 or 4 ampères on the primary of a 12-inch coil, interrupted by a Mackenzie-Davidson mercury motor break. Accumulators giving 24 volts are used. He thinks that a soft tube gives the best results. Now and then slight folliculitis develops; this is superficial, and disappears on appropriate treatment. He has never treated a child less than four years old.—*The Dublin Journal of Medical Science.*

R.H.C.

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THE ACTION OF X-RAYS ON THE TISSUES, WITH SPECIAL REFERENCE TO LEUKÆMIA.

By R. HIGHAM COOPER, L.S.A.,

Physician in charge of the Electrical Department at Tottenham Hospital; Assistant in the Electrotherapeutic Department at University College Hospital.

(Read before the British Electrotherapeutic Society, November, 1905.)

Mr. President and Gentlemen,—In March of this year I published in our Journal a collection of cases of leukæmia treated with X-rays, which I had abstracted from the various English and foreign publications, and ventured to discuss the probable action of the rays. Having observed the occurrence of toxic symptoms in patients submitted to large doses of X-rays, I suggested that their action might be to produce toxins in the blood, which destroyed the excess of leucocytes, remembering, however, that a large destruction of leucocytes would of itself produce such symptoms.

The recent researches of Werner (confirmed by Exner, Hoffmann, and Schulz) help us to place the question on a more precise foundation. He found that *lecithin*, after exposure to X-rays, undergoes "a kind of decomposition, manifested by changes in colour, taste, and smell." The character of this decomposition he does not define, but we know that in the metabolic process lecithin is split up into stearic and glycero-phosphoric acids and choline. Halliburton gives the following equation :—

$$\underset{\text{Lecithin.}}{C_{44}H_{90}NPO_9} + 3H_2O = 2\underset{\text{Stearic acid.}}{C_{18}H_{36}O_2} + \underset{\substack{\text{Glycero-}\\\text{phosphoric acid.}}}{C_3H_9PO_6} + \underset{\text{Choline.}}{C_5H_{15}NO_2}$$

Now choline is an alkaloid with similar properties to muscarine though much weaker in its action, that is to say, it lowers blood pressure, both by direct action upon the heart and also by dilating the vessels of the splanchnic area. In patients who have had large doses of X-rays I have several times found marked lowering of the blood pressure and have also discovered the presence of choline in the urine, so that it seems more than likely that the X-rays cause a decomposition of lecithin in the body similar to that which takes place as a normal process. Lecithin *in-vacuo* does not appear to be affected in quite the same manner, degeneration does not take place, but it appears to be rendered less stable, and on gaining access to oxygen it rapidly splits up.*

* Since the above was written it appears that the curious smell produced when lecithin is treated in this manner is due to the formation of methyl-amine. R.H.C.

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We find then that lecithin in the body is decomposed by the X-rays and it seems more than likely that other of the body constituents are split up in similar manner. It has long been recognised that the action of the X-ray upon a photographic plate is dissimilar from that of light, and I have wondered whether the gelatine emulsion played an active part in the process. With this idea I exposed collodion plates to X-rays, and found them to be practically unaffected. I then soaked some unsized paper in silver bromide and exposed it with a similar result, thus proving fairly conclusively that the presence of gelatine is essential. When we think of the large part that gelatine plays in its various forms as a constituent of animal tissues, the fact of its decomposition on exposure to X-rays would largely explain the action of these rays. But these are mere suggestions; I am at present working out this question and hope to publish my results before long.

It was formerly thought, from the so-called "burning" action of X-rays upon the skin, and from their beneficial effect upon epithelioma and other diseases of the skin, that they had a special selective action on epithelial structures. More recently, however, we have seen that glands, and all neoplasms of a glandular nature, are the structures affected to the most marked degree. May I not now go a step further and suggest the true cause of the "X-ray burn"? Let us look at its most prominent characters. The burn

(1) Starts three to eight days after exposure;
(2) Has its maximum effect three weeks after exposure;
(3) May resemble a local gangrene;
(4) Takes a very long while—often six to nine months—to heal;
(5) The skin ultimately formed is atrophic in nature.

To me all these signs point to inhibition or destruction of the trophic nerves and not to direct action upon the epithelium as is so commonly stated. And when we know that so large a constituent of nerve-tissue as lecithin actually is decomposed by the X-rays, we find material evidence for that suggestion.

Returning to our cases of leukæmia, we have now to consider the post-mortem changes found in those patients who succumbed after X-ray treatment. Most present, to a greater or lesser degree, the same remarkable features: fibrosis of the liver, spleen, and kidneys, with, in several instances, an extensive deposit of lime salts in the kidneys, especially on the left side; one case presenting calcification in the left kidney, while the right remained normal.

Some of the cases died not from advance of leukæmia, for the condition of spleen and blood has been found to be a—leukæmic, but from failure on the part of the kidneys to fulfil their proper function. In those patients who are still

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living and of whom we have a later report, we find that the improvement from treatment was more slow, and that relapses (though of less severity than the original condition) have occurred. Unfortunately in most of the published cases we have no record of the dose of X-rays given, but I surmise from any data that are given that these patients had smaller doses of the rays than the others. We find then that the rays have the properties of destroying and possibly inhibiting the production of leucocytes (probably by producing changes in lecithin and other substances), and also of inducing fibrous degeneration in glandular structures, particularly in lymphoid tissues. My own observations tend to show that this fibrous tissue formation is greatest when doses of X-rays are given sufficiently large to produce what is commonly termed "marked reaction" in the patient.

We also find in some cases deposits of lime salts in the kidneys and, in one case, in the spleen. It has been suggested that this is due to the production of toxins in the blood from disintegration of numbers of leucocytes. While to some extent this may be the case, I cannot altogether agree with the theory, and for these reasons :

It has been customary, in cases of leukæmia, to give exposures which, when summed up, include the greater part of the body ; for instance, the whole area of the enlarged spleen is commonly rayed, and of course this may include the greater part of the abdomen. Then treatment is also given to the sternum and the ends of the long bones, so that we get exposure of practically all the abdominal organs, except perhaps the right kidney and the generative organs. The right kidney must, however, always be more or less exposed to the more penetrative rays. Now in these autopsies we find no mention of changes occurring in the unexposed organs, and those found in the right kidney were less than in the left. This applies both to fibrosis and calcification. With regard to the latter phenomenon a case of my own presents points of interest : A woman was sent to me for X-ray treatment for recurrent carcinoma, the left breast having been removed four months previously. There were tiny nodules in the scar, and an enlarged supraclavicular gland. This gland, I was told, had enlarged during the past few weeks, and when I examined it was the size of a filbert. I exposed the whole of the left pectoral region, with a special application of the rays to this supraclavicular gland.

The tiny nodules in the scar soon disappeared, and treatment was continued at intervals for prophylactic reasons. The gland, however, although I pushed treatment until an erythema appeared, never diminished in size and remained hard. Eventually the patient died with recurrence in the liver. At the post-mortem the enlarged gland was examined

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and found to be calcified. Calcification was not found elsewhere.

Although evidence is not sufficient to lead one to a definite conclusion, I am inclined to think that these extensive changes in the abdominal organs are due to direct exposure to the rays rather than to the transference of toxins or other agents produced in the blood; and in this supposition I am supported by the fact that, although patients suffering from schirrus and other intractable diseases may continue under X-ray treatment for years, one never hears of fibrous or calcareous changes occurring in the abdominal organs, which are, of course, not exposed in these patients.

It may be said that there is not this enormous excess of leucocytes in such cases, but to that I would say that it is quite usual to produce toxic effects, yet these toxins do not cause fibrosis in unexposed parts, although carcinomatous masses directly exposed frequently develop fibrous tissue, which to a great extent accounts for the decrease in size of the neoplasm.

It seems necessary then to modify somewhat the treatment of cases of leukæmia. Benefiting from the published results of this disease I have adopted a more cautious method in cases under my own observation. I first carefully protect all the abdominal organs. paying special attention to the right kidney and the liver; the left kidney, from its situation, must necessarily be more or less exposed. I then apply the rays to the splenic area, though do not consider it necessary to expose the whole of an enormously enlarged spleen. The tube should be of very high vacuum—5 inches alternative spark gap. I keep it 12 inches from the part exposed and give a ten-minute exposure, putting a current of about 50 colts at 10 to 12 ampères through the primary. A milliampèremeter in the secondary cannot be used with advantage under these conditions, as the current through the tube is too small for accurate registration. Exposures are given on alternate days. A blood count should be made weekly, and care must be taken that the ratio of whites to reds does not improve too rapidly. The temperature is also carefully watched, and a rise of a toxic nature demands omission of one or more treatments. It is somewhat difficult to distinguish between a rise in temperature due to toxin and one due to a fresh exacerbation of the disease, but, taken in conjunction, the blood count and the temperature form very reliable guides. I have noticed several times that on the third day after treatment has commenced (whether for the first time or after a "rest") there is a slight rise in temperature, which drops on or about the sixth day to a more normal level than previously, and this improvement continues until toxic symptoms appear and the treatment is stopped. For

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example: In one patient the temperature before commencing treatment averaged daily a variation of 99·4 to 102, on the second day of treatment it was 99·6 to 101·8, third 99·2 to 102·4, and continued much the same until the sixth day when it was 98·6 to 100, and then remained low until, for two consecutive days, after five weeks' treatment it ran up to 102, and exposures were discontinued for a week. The temperature came down on the third day of the "rest."

I also give a similar exposure to the knees. In cases of leukæmia I have noticed an unusual tolerance of the skin for the X-ray, an erythema being rarely produced. Bronzing, however, is very marked; in one lady the skin over the spleen turned nearly black and desquamated, leaving normal white skin underneath, which again became bronzed on exposure to the rays. This lady, it is true, was taking arsenic at the time, but I have noticed the bronzing in cases where arsenic was not given.

One point which seems not to have attracted much attention is the great advantage of using, wherever possible, an unshielded tube, and this applies to all radiotherapy. The reason for so doing is, of course, that the secondary, tertiary, etc., rays, which are almost entirely cut off by a mask, are very useful for treatment, being probably more penetrative than the more direct rays.

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CONSERVATIVE GYNÆCOLOGY: ITS RELATION TO THE CONTINUOUS CURRENT.

By MARGARET A. CLEAVES, M.D., New York.

(Read before the American Medical Association.)

By conservative gynæcology must be understood any measure or measures which will tend to a restoration of the pelvic organs of women to normal functional activity, if not normal anatomical conditions. The two are not necessarily the same. A malposed uterus need not be a barrier to pelvic health and function, nor does a uterine fibroid always menace health and demand a surgical operation. Curettement for sterility is begging the question, for the uterine mucosa and the pelvic organs in general, which are the subject of perverted nutritional conditions, do not demand a destructive measure to restore them to healthful function. On the contrary, such an expenditure of energy as will tend to the production of nutritive changes without such destructive action, is indicated. Gonorrhœal vaginitis, gonorrhœal salpingitis, prolapsed vaginal walls, forming cystocele and rectocele, retro-displacements, anterior flexions, uterine prolapse, pelvic exudates, do not necessarily require surgical interference.

Since the time of Apostoli the value of the continuous current in conservative gynæcology has been recognised. But, however skilfully used, his method possesses untoward features on account of the danger of exciting inflammatory conditions, pre-existing with their unfortunate sequelæ of exudates and adhesions. No matter what work is to be done, what obstacle to be overcome, there is no need of using a sledge-hammer blow when the flutter of a butterfly's wing or the tap of a feather, so to speak, will suffice. There are methods of using the continuous current, in the class of conditions enumerated, as well as others, which are as yet too little appreciated. The work of my fellow founder-member of this Association, Dr. G. Betton Massey, has made the use of mercury at the anode with massive doses of current classic, and to him belongs the greatest credit for his continued and persistent efforts in the mercuric cataphoric sterilisation of cancer.

In this instance, the applications are characterised by great current density and massive dosage.

The action of the current upon oxidisable electrodes at the anode with mild doses in the treatment of endometritis, of fibroids, of pyosalpinx, and of gonorrhœal vaginitis is to be preferred in every instance to the simple polar action of the current. With the latter, no matter whether anodal or cathodal, there is a destructive action at the anode by coagu-

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lation, and at the cathode, by reason of chemical action, resulting in the production of scar tissue. With mild currents this scar tissue is slight, but it exists. Not so from the action of oxidisable electrodes at the anode and the transfer of the ions of a given metal; copper, silver, zinc, zinc-mercury amalgam.

Twelve years ago it was my pleasure to present this subject to the members of this Association. In all these years it has been my main reliance where an invasion of the uterine cavity became necessary. Experience has taught me that the maximum dose of 30 milliampères advised by Goutier need never be exceeded, while 20 milliampères is oftener used. By this method the nascent ions of copper, silver, zinc, or mercury are transferred deep into the uterine mucosa or of the urethra, and the action is much more energetic and profound than can be obtained either by polar action or by the topical application of medicaments. Two intra-uterine applications in a bleeding fibroid or endometritis, or uterine hyperplasm during a menstrual cycle can rarely be made. One is productive of greater good and should be made the middle of the month.

Careful technique is essential. That the method itself is strictly antiseptic is no reason for the neglect of strict antiseptic precautions. The introduction of the uterine electrode is, in my hands, accomplished ninety-nine times in a hundred without giving pain. Applications are from five to fifteen minutes in length. If copper or silver has been used, the electrode is lightly adherent to the uterine mucosa, and after turning the current gradually off, the poles are reversed in order to release it. Rest in the recumbent position is always insisted upon afterwards.

No matter what the condition, the cavity of the uterus is never invaded, until the patient's tolerance has been fully established by applications of the current, characterised by current-distribution. In gynæcological practice the vaginal hydro-electric applications of the continuous current are depended upon at first in every case. Where it is desirable to utilize the action of the ions of silver, copper, zinc, or mercury, silver and copper wires replace the platinum wire of the vaginal water electrode, or the medicaments are placed in solution and the ions of the fluid electrolyte are transformed directly into the vaginal mucous membrane, as well as all the pelvic tissue. Better results are obtained than by simply placing a metal electrode within the vagina, for by means of the fluid electrolyte of from 3 to 4 quarts the vagina is distended and every interstice unfolded, so that not only is there a complete lavage, but the action of the current alone or supplemented by the ions of mercury, zinc, silver, is brought to bear upon every part of the vaginal mucous membrane, the vaginal vault, and indirectly upon the uterine

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body and adnexæ. It is current distribution in the highest sense. Such are the methods which I described at the meeting of this Association eleven years ago as spinal hydro-electric applications and which have been in daily use ever since.

The profound effect of this gentle, well-distributed, and painless expenditure of energy is illustrated by the following cases:—

Case 1. Bleeding fibroid, been curetted twice, patient spent three weeks out of four in bed, treated by applications of the continuous current, vaginal hydro-electric anodal. Menorrhagia controlled. At suitable periods after menstruation intra-uterine applications anodal, with silver electrode were made at intervals of eight to ten days. Patient improved, gained strength and colour, disappearance of symptoms. Returned home a little after two months. Was she cured of her fibroid? No; but the distressing symptoms of pain and pressure and hemorrhage were controlled, with improvement in the general health.

Case 2. Similar to above, suffered from prolonged, excessive, and continuous hemorrhages. Entire uterus involved, and she was weak and breathless with disturbed heart action. Vaginal hydro-electric applications of continuous current anodal, used at first, later, twice in a month, intra-uterine silver applications, the mytmonily one in the middle of the month, with vaginal hydro-electric applications cathodal (hemorrhage under control) between times. After less than three months the patient is in rude health, the growth is smaller and better defined, and giving no signs of trouble.

When it is remembered that electrolysis chemically and cataphoresis mechanically alters the amount and distribution of salts necessary to the proper nutrition and function of the various parts of the living organism, these results are clearly explained. This effect may be carried to the extent of completely cutting off the blood supply, thereby causing immediate and actual destruction (electrolysis of a mole); or by interfering with it to such an extent that there is no channel left by which the inorganic constituents and proteid nutriment can be conveyed to the part, and death from starvation ensues (absorption of organised inflammatory exudate or an intramural uterine fibroid); or in a lesser degree, only the normal ionisation and osmotic action characteristic of living tissue. The one condition or the other will obtain according to the quantity of the current, and the manner of its use, that is, whether a strong or mild current is used and whether the application is characterised by current distribution or current density. The use of a strong current of short duration, return of former symptoms. Same result again secured, save pregnancy, to which patient strenuously objects. Aged 42. As to sterility, it has been my happy experience to overcome

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characterised by a current density, has either an intense irritant or else a distinctive action, whereas the same current, if characterised by current distribution, will produce an entirely different effect, because by reason of the increased electrode contact—square inch area—the energy expended in each square inch is diminished in proportion to that increase.

A mild current, if long continued, will cause a profound change in the amount of fluids and salts in a part, and in this physical fact is to be found the therapeutic indication in pathological states.

M. R., widow, aged 59, domestic duties. Uterus retroverted, held back by exudates, right ovary prolapsed, enlarged and sensitive, vaginal mucous membrane red and congested. Twenty right continuous current hydro-electric applications were given, resulting in nutritional gain, *i.e.*, increased weight, improved colour, better circulation, less pain and congestion; right ovary smaller, less sensitive, less markedly prolapsed; absorption of exudates. An intolerable existence made tolerable, without restoring organs to correct anatomical position or to physiological condition.

Mrs. —, aged 40. Had a severe inflammation, involving all the pelvic tissues. Came under writer's care after several years of invalidism, during which time she was bedridden for at least three weeks out of four. Pelvis was literally roofed in, uterus immobile, ovaries bound down in exudative mass. The task demanded all the skill and experience possessed in this class of work as well as the most exact technique and knowledge of the properties, physical and physiological action of the energy used. After two or three months of most careful, gentle and persistent effort, the desired result was obtained and absorption established with the modification of all her symptoms and relief from some. Vaginal space much less encroached on and the pelvic organs mobile.

Mrs. C., aged 33. Intramural fibroid in right and anterior walls of uterus; ovaritis right; exudates right side, uterus immobile; canal tortuous; pelvic pain, soreness, sensitiveness to pressure, especially right iliac fossa; cruralgia; constipation; profuse and premature menstruation. Twenty continuous current treatments vaginal hydro-electric (polarity according to indications) were given, over a period of four and a half months. Result: Complete relief of all symptoms, disappearance of exudates, return of uterine mobility, regular bowels, regular normal menstruation, relief of crucial pain, and establishment of general health. Fibroid mass firmer, harder, and better defined, slightly diminished in size. A few months after cessation of treatment patient became pregnant, having been sterile for seven years; passed through normal pregnancy, and gave birth to well-developed child. Absolutely well since birth of child until last winter, ten years, when

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this condition in retro-displacements, when complicated by fibroids, endometritis, a relaxed and atonic condition of all pelvic organs. Since I began the use of the oxidisable electrodes at the anode and vaginal hydro-electric applications, I have never curetted nor had a patient curetted, although that was my former custom.

Mrs. T., aged 35. Sterile from marriage, became pregnant after two months' treatment by vaginal hydro-electric applications. There was a complete relaxation and atonic condition of all the pelvic structures with slight catarrhal endometritis.

In a case of chronic gonorrhœal vaginitis, urethritis, and cystitis of two years' standing, presenting the classic symptoms, symptomatic relief was at once established and also physical conditions changed. The patient made a complete recovery after three months' treatment. A relapse; the subsequent reason, husband under care of genito-urinary specialist; same result again secured and has now been well for past three years.

In a case of gonorrhœal pyosalpinx, curettement had been advised but refused. Pain, severe and calicky in character, with burning sensation, intermittent flow of mucopurulent discharge (greenish in colour), menorrhagia and metrorrhagia, sterility, loss of flesh, very nervous, fever. Left tube was found to be actively involved, tender thickened, enlarged, and at times much distended. Oxtium internum permeable. Vaginal hydro-electric applications were made twice a week, and at suitable intervals once in eight or ten days; an intra-uterine application with copper electrode, with 10 to 20 milliampères of current, for ten minutes. Medicated tampons were used part of the time to maintain pressure over the diseased tube. After three months the patient was relieved of all her symptoms, subjective and objective. The following season there was a relapse, which was again relieved by similar treatment, and for the last five years patient has remained well.

A woman, aged 39. Multiple fibroid, menorrhagia, and metrorrhagia, pain and pressure symptoms. Small growth in cervix, another subperetoneal laterally and to the right, large as fœtal head. an intramural in the posterior wall filling the recto-vaginal space. Canal tortuous and would not admit passage of intra-uterine electrode.

Treatment by vaginal hydro-electric applications of the continuous current. From their use improvement was established, but the distressing symptoms still remained in evidence. I, therefore, made a series of three cupric punctures to the growth in the cervix, anodal, with current of 10 milliampères to each puncture, the indifferent electrode on the abdomen. The needle was carried in to the depth of

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¼ to ½ inch, and the entire *séance* lasted but ten minutes. The deposition of the ions of copper into the cervical growth was very prettily shown by the characteristic apple green colouring. Three months later the cervix was absolutely free from fibroid and perfectly normal. Six months after these punctures, a series of four to six cupric punctures anodal were made per vaginam in the dependent portion of the posterior growth. A month later another series was made. There was no indications of an approaching menopause, nor was it to be expected from her age, 39 years; but she had but one menstruation for months after the last series of punctures and but one since then, one year later, in 1899. When last seen, the subperetoneal growth was not bigger than a hen's egg, the posterior growth markedly smaller, bowel function normal. This patient was under weekly surveillance for several years.

X-ray Treatment of Leprosy. — Dr. H. B. Wilkinson, physician in charge of the San Lazaro Leper Hospital, Manila, has been treating leprosy with X-rays since the end of 1903. The method adopted was that of approaching as nearly as possible to the "burning point" without actually causing a "burn." One or two cases, however, in which burning was accidentally produced resulted in a cure. Tabulated results of the thirteen cases treated show that three were cured, seven improved, and three not improved. He makes the following statements:

"1. The treatment of one leprous spot on a patient produces improvement in spots at a distance from the one actually treated.

"2. The cure in the distant spots seems to progress parallel to and to be just as complete as that in the one treated.

"3. The best results seem to be obtained only when treatment is pushed to the point of killing or beginning to kill the tissues, which would also probably be to the point of killing the organisms.

"4. Cases in which there are massive localised leprous deposits, as in case No. 5, are most rapidly improved, as in these cases we have an abundant culture on which to operate and thereby produce immunity more rapidly.

"5. In diffuse general involvement of slight degree or atrophic character where there are only a few scattered organisms we have had little success.

"6. In two well advanced cases where the amount of new leprous tissue was excessively great, the improvement was marked and rapid, but followed by loss of general health and rapid physical decline. This may be an over dosage, so to speak."—*Med. Record,* December 9th, 1905. R.H.C.

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NOTES AND ABSTRACTS.

The Treatment of Dulness of Hearing and Subjective Noises in the Ears by High Frequency Currents.—In the *Glasgow Medical Journal* this subject was discussed by Drs. Galbraith, Connal, and James R. Riddell. The cases selected for electrisation were ones in which other methods of treatment had been used but found ineffectual. For instance, in chronic catarrh of the middle ear, catheterisation of the Eustachian tube or inflation of the middle ear had been tried. In nearly all, complaining of tinnitus aurium, drugs, such as bromides, hydrobromic acid or strychnine had been used ineffectually. In addition, any nasal defect which might have an influence on the aural condition was rectified. In all, forty patients were treated, but final results could not be obtained in eight of these, leaving thirty-two cases to report. Notes were taken of the hearing distance with the watch and the tuning-fork reactions. These were carefully checked after the treatment had been discontinued.

1. Chronic dry catarrh of the middle ear with labyrinthine involvement (six patients). No improvement in any of them, but two patients thought that the noise had decreased.

2. Chronic dry catarrh of the middle ear without marked labyrinthine involvement (fourteen cases). Ten of these had tinnitus, eight reported improvement. In one case the noise disappeared altogether. In two cases there was some improvement of hearing.

3. Post suppurative conditions (five cases). Five had tinnitus and four reported improvement.

4. Sclerosis of the middle ear (five cases). All showed improvement, markedly so in three and slight in two. In one of these, who had persistent and loud tinnitus for four years, there has been no noise for the last four months.

One case of primary disease of internal ear and one of tinnitus, without deafness, derived no benefit from treatment.

The treatment of diseases of the ear by high frequency currents may be carried out in various ways. The patient may be treated by general electrification or local application of the currents, but it must be remembered that local applications have a general effect.

Local applications may be applied as follows :

1. By means of the effluve taken from the resonator applied to the side of the head. The multiple electrode is held as near the patient as possible without producing sparking.

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2. By means of condenser electrodes, which are attached to each end of the solenoid, and introduced into the external auditory canal.

3. By metal electrodes, placing one against another, that is applying the currents "by derivation." This method is apt to be painful unless carefully done.

It has been shown by d'Arsonval and others that high frequency currents have a profound effect on nutrition generally. Under their influence there is a great increase of the secretions, and in the output of heat. If the benefits derived depend on these properties, then the proper way of applying treatment would be by general methods. There may, however, be other explanations. There is a great alteration in the circulation produced by the currents, not only in the general arterial tension, which is first lowered, then raised, and remains above the normal for a considerable time, but there is a marked local effect, the capillaries being greatly dilated.

There is another possible explanation, namely, there may be a fine mechanical vibration set up by the passage of the current.

In connection with the supposed germicidal effect of this form of electricity it has been suggested that the cultures are rendered sterile by the mechanical vibration set up in the media. On account of these properties—alteration of local supply and mechanical vibration—local treatment may be expected to be more useful than general. R.H.C.

* * *

Death by Electricity.—A recent and interesting contribution to the subject of electrical death is contributed by Jellinek. It is well known that the effects of the electric current vary greatly in their manifestations. Death may be caused either by the direct or by the alternating type of current of either high or low tension. In most instances immediate unconsciousness results, although authentic cases are on record where the victims of the shock remained conscious for several minutes before death finally took place. In fatal cases there is an immediate relaxation of the muscular system, unless the individual remains in contact with the conductor; in the latter case a tonic spasm results. Respiration and heart action may cease at once or a gradual cessation of these functions occurs. Animal experiments and the observations made on the human subject show that there is no definite symptom, however, which characterises electrical death. The explanation of the wide variations which have been noted must be sought for on the one hand in the

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electrical conditions, and on the other in the resistance of the individual affected.

In any given fatal case the current may be said to exert a double effect. When it enters the body it acts as an enormous irritant which manifests itself as shock. It has been found that this particular effect can be eliminated to a greater or less extent, as shown by the fact that it is reduced to a minimum or absent altogether when the current enters the system during narcosis or during sleep. In addition to the psychic phenomena just noted there is also manifested a dynamic effect on the various aggregations of body cells, which probably amounts only to a disturbance or at the most to an inhibition of one or more of the vital functions. In fact, experience has shown, and this has been confirmed by animal experiments, that the threatening and seemingly fatal symptoms of impending death due to the electric current are very often only transitory in character. Jellinek claims that in most instances death is merely apparent. If we are to act on the author's suggestion, a fatal issue should not be accepted as having occurred until energetic and prolonged efforts at resuscitation have been carried out in a systematic manner without result. And this raises again the question as to when death occurs in cases of so-called electrocution—whether it is while the subject is in the chair or while he is on the post-mortem table.—*Wiener klin. Woch.*, November 2nd, 1905.

R.H.C.

NOTICES OF BOOKS.

MANUEL D'ELECTROTHÉRAPIE ET D'ELECTRODIAGNOSTIC. By Dr. E. Albert Weil. 2nd edition. Published by Felix Alcan, Paris. Price 4 fr. 60.

The publication of a second edition of this hand-book so soon after the first is considerable evidence of its worth. The book has been entirely re-written and several chapters added, those on phototherapy and radiotherapy showing the most alterations. The chapter on radiotherapy describes very completely measures for protection and for accuracy in dosage. Although we do not find anything that is actually new we can recommend the work as being concise and up to date.

R.H.C.

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CORRESPONDENCE.

The Effect of the High Frequency Currents on Arterial Tension.

To the Editor of the Medical Electrology and Radiology.

Sir,

In the November number of the Journal there is a paper by Dr. Bonnefoy, of Cannes, which I have read with great interest. It treats of the Effects of High Frequency Currents on Arterial Tension. As I had the honour at the Leicester Meeting of opening the discussion on this, to my mind, important subject, perhaps I may be allowed to claim your indulgence for a few remarks and to correct a few misapprehensions of the writer.

In speaking of my remarks at Leicester Dr. Bonnefoy says, in speaking of the effects of the high frequency currents in lowering the arterial tension, "But one must not confound the tension with the temperature, and it seems to me in this respect that the communication of Dr. McClure tends to error." Now, in point of fact, I never said one word of any influence the high frequency currents had on temperature. All my experiments in this direction on the healthy, or comparatively healthy, human organism were decided by negative. The remarks I made on influencing temperature were by means of the constant galvanic passed through the base of the brain.

With the other parts of Dr. Bonnefoy's excellent and suggestive remarks I am glad to find myself in hearty accord. I have always held that when we have abnormally high blood pressure it can be lowered by a judicious application of high frequency currents. In the case of Dr. Elliott's, with very low blood pressure, I do not think I said I would *fear* to apply these currents, but that I had no experience, and that I should treat such cases with static electricity, in which I had some experience of their utility. I can quite fully appreciate Dr. Bonnefoy's reasons in using hign frequency in such a case; I quite agree with him in regard to the danger of these applications, as far as my experience goes. In the warming effects he describes I quite agree.

In conclusion, I consider that Dr. Bonnefoy has made a most valuable contribution to the subject under discussion.

H. McClure.

Weymouth Street, W.

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Thirty-third Ordinary Meeting of this Society was held at 11, Chandos Street, W., on Friday, November 24th, 1905, at 8.30 p.m. The President, Dr. DONALD BAYNES, in the Chair.

Present:—Nineteen members and three visitors.

The minutes of the previous meeting were read and confirmed.

The following gentlemen were unanimously elected ordinary members of the Society:—William D'Oyly Grange, Harrogate; Edwin Harral Thos. Nash, Accrington; Arthur Gerald Welsford, Hemel-Hempstead.

Mr. CHISHOLM WILLIAMS showed a case of carcinoma of the breast, treated by X-rays.

Dr. R. MORTON read a paper entitled "A Contribution to the More Accurate Measurement of X-rays," illustrating his remarks with a demonstration on the use of the oscillograph vacuum tube. Drs. Lewis Jones, Reid, Batten, and Butcher took part in the discussion.

Mr. R. HIGHAM COOPER read a paper on "The Action of X-rays in Leukæmia." Dr. Ironside Bruce and others took part in this discussion.

A paper from Dr. E. BONNEFOY, of Cannes, was taken as read and ordered to be printed in the Journal of the Society.

The President announced that it had been decided in the Council to hold no meeting in December owing to the only available date coming so near Christmas.

The meeting then adjourned.

NOTICE.

Members taking part in discussions or making remarks on papers, etc., are earnestly requested to give their notes on same to the Secretary at the end of evening, so that the proceedings may be complete and not delay the prompt publication of the Journal.

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MEDICAL

Electrology and Radiology.

No. 2. FEBRUARY, 1906. Vol. VII.

EDITORIAL.

With this issue the Editor takes leave of his readers with regret, but has much pleasure in announcing that Dr. Lewis Jones has undertaken the future conduct of the Journal with Mr. R. Higham Cooper as the Assistant Editor. It is a matter for congratulation to the Society that he has consented to undertake the office, and we feel that no better selection could have been made. We have to note also with regret that, owing to press of work, Dr. M. A. Cleaves, the American Editor, has been compelled to resign the position which she has so ably filled for some considerable time, and to accord her our best thanks for her able assistance.

The services which have been rendered by Dr. Margaret Cleaves, both to this Journal and to its forerunner, *The Journal of Physical Therapeutics*, have been worthy of the highest praise, and her regular contributions to our pages will be greatly missed by our readers. We may hope to be favoured occasionally with articles from her pen.

The Editor wishes also to thank all those who have helped in the conduct of the Journal, and especially Mr. Cooper, who has been of the greatest help as Sub-Editor during the past year. It is hoped that the proposed arrangement of reporting the discussions of the Society by an expert stenographer will be adopted and continued in future, as such a procedure would greatly lighten the labours of the Secretary and the Editors. In conclusion, the Editor wishes all prosperity to the Journal under the new government.

A report of the proceedings at the annual meeting of the British Electrotherapeutic Society, is printed in another part of this issue.

The Society has entered upon the fifth year of its existence with a strong list of names both for officers and council, and the year 1906 may be expected to prove a year of activity in the annals of the Society.

It is to be hoped that all members will put their shoulders to the wheel with the laudable desire of trying to strengthen the position of electrotherapeutics in this country, and to secure for it the respect which it deserves. The Society wants more members of the right kind for the sake of their personal

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support and for their subscriptions. The maintenance of a monthly journal to represent electrotherapeutics in Great Britain is of great importance to those who practice in our special line of medical work, and is an object upon which a considerable part of the income of the Society is willingly and rightly expended.

Every additional member helps to ensure a strong position to our Society and a wider influence to our Journal.

The Council have under consideration the holding of a provincial meeting at Bristol, towards the end of July. This should be acceptable to the members of the Society who practise in the West of England, and we hope to see them present in force on that occasion. The meeting will probably extend over two or three days, and a goodly list of papers and communications may be expected. Details will be communicated in due course.

* * *

On the 13th of February a person who had set up an Electropathic Institution in Bristol, was fined £10 and £5 costs for using the title of doctor, although not registered under the medical acts. The prosecution was at the instance of the Medical Defence Union. The history of this case, so far as it interests our readers, is as follows:

In December last there appeared in a Bristol paper a gross advertisement of an Electropathic Institution in that city. Mixed up conspicuously in this advertisement was the name of a medical man, the author of a well-known book on electrotherapeutics. The advertisement was so worded that it might suggest to a casual reader that the medical practitioner was in some way associated with the Bristol Electropathic Institution. Not long afterwards an apology for the unauthorised use of the medical man's name appeared in the same paper, with an undertaking that in future advertisements no reference should be made to the name of any registered medical practitioner. Both the apology and the conviction have been obtained at the instance of the Medical Defence Union, who at once took up the matter and carried it to a successful conclusion with their usual energy and promptitude. Their action in this case has been of very great value to all medical men who are engaged in electrotherapeutics, and we are sure that the efforts of the Medical Defence Union will be fully appreciated by all our readers. We think that those among our readers who have not yet joined the Medical Defence Union should make haste to do so.

* * *

Another case of X-ray burning has recently been before the public and contains some points of interest. It appears that

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a gentleman, living in Bournemouth, brought an action against a firm of druggists in that town to recover damages for alleged negligence in the application of the Röntgen rays and for the suffering and loss resulting from their application. The defendant's case was that the treatment had been carried out under medical orders and that the medical man was the person who ought to have been proceeded against. This is the first point to note. In the course of the trial it was stated by two medical men that X-ray burns could be avoided by the exercise of proper care and skill. On the other hand evidence was given by two alleged experts who were not medical men, and they are reported to have stated that X-ray burns could not be avoided even when burning was not intended. This is the second point. It is hardly necessary to insist on the obvious moral, viz., that a medical man is likely to have advanced further in a knowledge of the details necessary for the therapeutic application of X-rays than could be the case with unqualified persons. In the end the jury disagreed and they were discharged. There appears to have been eleven applications administered in the month of December, and the dermatitis developed in January.

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ELECTROTHERAPEUTICS AND THE MEDICAL PROFESSION.

By DONALD ARMOUR, F.R.C.S.

(Address delivered to the British Electrotherapeutic Society at the Annual Meeting.)

Mr. President and Gentlemen,—When your President, my friend Dr. Donald Baynes, paid me the great and unexpected compliment of asking me to address you at this, the Annual Meeting of the British Electrotherapeutic Society, my first thought was a doubt of my fitness for such a task, coupled with a fear lest some of you may question how great can be the interest in Electrotherapeutics taken by a surgeon, and one too who suffers from the unforgiveable sin in this country of being young.

I might well have hesitated, had it not been that I felt I had a right to exhibit a three-fold interest in the subject of electrotherapeutics. The first concerns my own desire to learn and understand as far as I can the advances being made in this branch of our profession. Electrotherapeutics and other physical methods are none of them to be dispensed with or ignored by the scientific surgeon or physician, or by one who has any claim to keep abreast of the times.

The second interest I can lay claim to is that, as a member of the medical profession, I desire to see its members, whatever their various branches of practice, treated with equal justice, and equal favour from within the profession; and wish —nay demand—that your branch, as the youngest and the greatest sufferer, shall be protected by a loyal co-operation on the part of the whole profession from a dangerous and degrading competition from without.

The sin of youth is sufficiently condoned by the knowledge that to youth alone can we look for reforms in this world, and our profession needs many reforms.

If we look back to the time when there existed only the rudest constructions for practical work in electricity and medicine, and no instruments of precision, and then consider what innumerable gradations and manifestations of electrical force we now have at our hand, then we may appreciate the enormous advance that has been made in the subject of electrotherapeutics.

Research in the field of electrotherapeutics has established upon a scientific basis methods which are rousing professional and public interest as has never been done before. Researches into the therapeutic properties of light since Finsen, and more recently Freund, have resulted in a thorough investigation of

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those properties, and have brought them into very general use. The radiant light baths, and heat localising arc and large incandescent lamps, are becoming recognised as therapeutic measures, and occupy already an important place in the practice of the medical profession. The administration of dry heat has claimed recognition, and has taken an important place in our therapeutics. Its effects are improving metabolism and influencing the processes of elimination to a remarkable degree.

The field for the employment of the X-ray is broadening as its action and use are better understood, and its uses and applications are being more precisely developed. Although our hopes have not been realised in the treatment of malignant disease, its scope has constantly widened, and it has been generally adopted for the relief of other conditions.

Concerning its uses in malignant disease, we surgeons have in the past been too prone to regard the X-rays as a last resort in treatment when all other methods have failed. I would plead for an earlier co-operation between the surgeon and the electrotherapeutist, especially in such conditions as carcinoma of the breast. It would appear from results recently published in other countries that by a preliminary course of application of the X-rays to malignant disease of the breast previous to operative measures, followed again by a course of application after operation, improved results may be obtained. It is certainly the duty of the surgeons at our large hospitals to co-operate with their colleagues of the electrical department for giving this method a fair and extended trial.

The lack of departments for electrical treatment, which was so conspicuous ten years ago, at almost all our larger hospitals, has gradually given place to fully equipped departments given over to the charge of specialists in the subject. How great the usefulness and the necessity of such departments are is shown by the figures I have taken from one of our large metropolitan hospitals. Here, in the year 1904, between 4,000 and 5,000 negatives were taken, and just under 30,000 patients attended the electrical and light department. This development has been accompanied by an increase of interest on the part of the students, who show themselves more willing to take up the study of electrotherapeutics under such improved conditions. This interest on the part of the students, coupled with the certain demand of parents that their sons shall be up to date in a subject of such widespread interest, must give rise to a fuller recognition of the subject of electrotherapeutics in the curricula of our medical schools.

The attitude of earnestness and determination to attain all that can be accomplished for the advancement of electrotherapeutics augurs well for the future prosperity and growth of this Society. It cannot to-day be said that this department

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of medical science is made up of the unsophisticated members of the medical profession. On the contrary, the scientific character of your papers and discussions marks the highest degree of medical progress, whilst indicating the future paths along which the successful therapeutist must travel.

It has been said that the history of therapeutics is a history of blasted hopes. Where one new therapeutic agent has accomplished even only a small fraction of what was in the beginning claimed for it, a hundred have failed completely. It is human nature to eagerly aspire to be the first to exploit the new. Herein lies to some extent the ease with which the advertising quack—or layman—draws into his net the always gullible public.

So it is that your branch of the profession has suffered more than any other from the invasion of unqualified persons, and that, it must be regretted, with the approval, or at all events the support, of members of our profession. By its very nature electrotherapeutics appeals to the quack and charlatan as a very Eldorado, where, uniting a superficial knowledge of medical catch phrases with the ready tongue of commercial instinct, he may look for large profits without running any great risk of loss, either financially or in reputation. Nor is this competition by unqualified persons limited to subjects of the British crown, but, as in everything else, you are subjected to a process of dumping from various foreign countries, so that you suffer from foreign competition, clothed in alluring guise, as well as from the unqualified home product. The extent to which these persons, either singly or in limited liability companies, are receiving support from members—some of them the so-called leaders—of the medical profession, makes it a matter which not only merits your undivided efforts to suppress, but one which concerns very seriously the honour and integrity of the medical profession as a whole. Not only do they support the competition of the unqualified in recommending patients to them, but they actually in some cases—to their shame be it said—continue to treat their patients in conjunction with these unqualified laymen. The employment by a hard-worked country general practitioner of a fourth or fifth year medical student under his direct supervision as his assistant, suffers condign and immediate punishment at the hands of the General Medical Council. What is the difference, I ask, between the unqualified assistant in these cases and the unqualified assistance derived at the hands of the electrician? The first has been made illegal by law, and so should the latter be, because it is unethical from the point of view of professional dignity and honour. One of the chief reasons why the unqualified exponent of electricity as a therapeutic agent is free, and likely to remain free, from the rigour of the law, is because his treatment in the vast majority of cases does not

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endanger life. He runs no risk therefore of falling foul of the coroner's inquest, or of the impossibility of his giving a death certificate, and though it is well known that the X-ray is capable of producing injurious effects in many ways, if unskilfully employed by those who have not acquired the knowledge of these effects, when these untoward effects are produced the unfortunate patient has no recourse against the unqualified one, and the opprobrium, which he is sure to cast upon somebody, is usually heaped upon the head of the medical profession.

The number of non-professionals to-day, who are taking up these agents for the treatment of the public, calls for a vigorous policy on the part of the authorities for the preservation of public health and safety. Even granted that some good may be done in a certain number of cases by these unprofessional manipulators, it is also true that much more harm will be done by those who know so little of the physiological actions and limitations of its employment. It becomes, moreover, a grave public scandal, and a far-reaching danger to the State, when the employment of electrotherapeutics is debased to an immoral and an improper use by a class of disreputable charlatans.

That these therapeutic measures should be included with drugs as means not to be used except by legally qualified practitioners of medicine is imperative, and it should receive the prompt attention of those who are placed in authority for the control of the profession of medicine.

The attitude of the Council of the British Medical Association towards your branch of our profession is scarcely to be comprehended, in view of the enormous advance that the study of electrotherapeutics has made in recent years, and in view of the position occupied in the profession by the large number of its members who have recourse to this form of treatment. Its refusal to recognise a separate section for electrotherapeutics at its Annual Meetings is, to say the least of it, reactionary and parochial. This refusal, I am led to understand, is based upon the following grounds:

They advance the contention that electrotherapeutics must be discussed in the section of either Internal Medicine or Therapeutics, and not separated therefrom. This, of course, is based upon the fallacy that the Members of the Association who devote themselves to internal medicine or drug therapy are fully competent to discuss satisfactorily the subject of electrotherapeutics. The day of the all-round specialist of years gone by has passed, never to return. The human brain has not kept pace in development of size or receptivity for any one person to be able to master the details of all the branches of our great subject. The science of electrotherapeutics is now progressing too rapidly, and the knowledge of the scope and

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possibilities of its agents has already gone too far for anyone, not directly applying himself to this branch of the profession, to be completely *au fait* with all its most recent advances.

Then I am informed that you were not granted a separate section at Leicester because no request for a separate section in electrotherapeutics was made to the Council by the Officers of the meeting at Leicester. In this way the Council throw the onus of the refusal upon the Officers of the meeting at Leicester. Yet when you overcame the difficulty by opening a section independently, the Council were indignant, and claimed the sole right to decide what sections will be held at the yearly meetings. Surely they cannot have it both ways!

I am also told that the question concerning the same matter at Toronto is still *sub judice*, having been referred to the Officers of the section on Therapeutics.

This is the more to be wondered at in view of the fact that so great has been the progress of electrotherapeutics in Canada, and so loud the demand of the students for special instruction in the subject, that the Senate of the University of Toronto have decided to add a lectureship in electrotherapeutics to its Faculty of Medicine.

Now you are probably as well aware as I am that this Society does not want for warm and strong supporters on the Council of the British Medical Association. How you can best aid their efforts to support you should be a matter for your consideration. One way appears to me to be certain of ultimate success, one which has well been described as a method of "sap and mine." Start the agitation in your different divisions, and representation in your branch councils, and so gain step by step a voice in the deliberations of the Central Council itself, either by members of this Society or by men pledged to support your aims and aspirations.

Everyone must agree that the future of electrotherapeutics is a matter of great importance to the whole of the medical profession as an ethical body, and one in which you all, as members of this Society, are deeply concerned. In your hands for the greater part must lie the future position of electrotherapeutics, as far as the medical profession is concerned.

How then shall the business of the quack and the unqualified be obliterated? An earnest and continuous endeavour should be made to do this by every member of our profession. We should appeal for greater professional integrity in the treatment of members of the medical profession as a whole.

The question that must concern you as a Society is how you may educate the members of our profession up to a proper appreciation and knowledge of the subject of electrotherapeutics, and point out to them the unethical action which they take when they see fit, as unfortunately many of them do, to

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recommend patients to the care of the unqualified electro-therapeutist.

Then again an appeal should be made to the Ethical Committee of the British Medical Association to pass judgment upon any of its members who are known to practise the employment of unqualified electrotherapeutists as an aid to the treatment of their patients. This is the constitutional method of procedure, and although no names are made public in any case brought to the notice of the Committee, yet it should have almost an equally deterrent effect upon the offender.

The practice of some of our leading chemists and instrument makers of setting themselves up as experts in the treatment of diseases which should properly be confined to the care of only duly qualified medical men, is a point which requires the attention of the profession at large. It would not appear a difficult matter, if the members of the profession co-operated, to make it clear to these persons that they are infringing upon the rights of qualified medical men. And if they persisted in their course, some form of treatment should be agreed upon to make them see the error of their ways. It is nothing less than scandalous that these persons, who depend almost entirely upon our profession for their profits, should be allowed to enter your branch of the medical profession without any qualification beyond the knowledge of the mechanism of electrical machinery.

We have heard a great deal recently of preferential treatment between nations. Is it not our duty as a profession to institute a system of preferential treatment amongst ourselves, and help, by our recognition of their work, and by a refusal to treat with their unqualified competitors, the members of our profession who have to do with the branch of electrotherapeutics, and to stamp out the present system of Free Trade in those branches of the profession to which the quack and the unqualified seek entrance, and endeavour to prevent the dignity and status of what should be a noble profession from being degraded and lowered in the eyes of the world.

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NOTES AND ABSTRACTS.

On the Measurement of X-ray Currents.—A paper read by Dr. Wertheim Salomonson before the Röntgen Society and recently published in the Society's Journal, is worthy of study as it puts forward some new views upon the much vexed question of the utility of the milliampèremeter as a measure of X-rays. The paper is partly taken up by the description of a resistance of slate which Prof. Salomonson has designed for measuring the efficiency of induction coils, and he proposes to use it also for measuring the amount of energy expended in an X-ray tube. The Professor is of opinion that for determining the output of X-rays, it is necessary to measure not only the current through the tube, but also the electro-motive force applied to the tube, or, in other words, that the production of X-rays is a function not of the current through the tube, but of the watts expended in it. If this is the case it would be necessary to take readings of the milliampèremeter and also to estimate the electro-motive force applied to the X-ray tube, and this might perhaps be roughly done by multiplying the observed current by a factor depending on the length of the alternative spark as measured with the tube in action. The Professor, though maintaining the view that X-ray production is proportional to the watts rather than to the current, does not bring forward in his paper any direct evidence to support it, although he states that some experiments made by himself with photographic plates appeared to show that there was a greater production of X-rays in proportion to current when high electrical motive forces were employed. Other observers have not noticed this relationship. D'Arsonval, on the contrary, has shown a series of X-ray photographs in which the photographic effect was proportional to the current through the tube, and bore no reference to the watts expended.

In a communication made by Dr. Lewis Jones at the meeting of the British Electrotherapeutic Society in Leicester in July last, a number of X-ray photographs were shown in which the photographic effect appeared to be closely proportional to the current through the tube, but had no direct relationship with the number of watts expended. Further evidence must be brought forward before the views of Prof. Salomonson can be accepted, and he has himself very rightly observed that the question is one that cannot be settled by mere reasoning. It is necessary to bear in mind that some part of the energy expended in the X-ray tube appears in the form of heat. This fraction may be a large one, and in any case it must be deducted before we can venture to estimate the output of

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X-rays from calculations of the energy applied to the tube. It is quite likely that the waste of energy in the form of heat may account for a large proportion of the total energy expended, and it is certain that no simple wattmeter measurement of the energy expended in the X-ray tube can be of any direct use.

Our readers will learn with regret that Professor Max Nitze, the inventor of the electric cystoscope, died on the 22nd of February from an apoplectic attack.

NOTICES OF BOOKS.

ESSENTIALS OF MEDICAL ELECTRICITY. By E. Reginald Morton, M.D., C.M., Toronto, D.P.H., Medical Officer in charge of the Medical Department, London Hospital. (London: Henry Kimpton, 1905. 192 pages, with 11 plates and 70 illustrations. Price 4*s*. 6*d*. net.)

This little book forms an excellent introduction to the study of electrotherapeutics and may be commended to our readers for their own use and also to recommend as a primer of medical electricity to any medical men of their acquaintance who are beginning to turn their attention to the subjcet. It contains nine chapters clearly written which deal with the fundamental principles of electricity, with the apparatus required for medical purposes, with physiological considerations and with the use of electricity in the diagnosis of nervous diseases. The uses of electricity in its numerous applications to general therapeutics and for the various special applications are also fully explained.

The author's work as medical officer in charge of the electrical department at the London Hospital and Medical School has made him proficient in the subjects of which he writes. His descriptions are clear and easy to understand. Any medical man who will assimilate the contents of this book will be in a position to make use of electricity in his practice with advantage to his patients and to himself. Plates of the motor points and of the areas of distribution of the cutaneous sensory nerves are appended to the volume, and these will be of great use in the employment of electrical currents in diagnosis. A chapter on X-ray work would have added to the value of the volume, and as that is a branch of electrical work which Dr. Morton is fully competent to deal with we may hope that in a future edition room may be found for a chapter on X-ray work.

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The gradual change which has come over electrotherapy in recent years has shifted the centre of gravity of the subject and has tended to make electricity much less the handmaid of nervous diseases than was formerly the case. Whereas ten years ago the study and treatment of nervous diseases was the the most promising line of work for electrotherapeutic specialists, we find to-day that other and more attractive fields of interest have been opened. We may instance Ionic medication, a subject until lately but itttle understood, which has been developed by the patient investigations of Leduc, who has opened up possibilities in the direction of using electric currents as a means for local medication. In this field alone we may find new therapeutic procedures of greater value to medicine than any hitherto offered by the treatment of nervous diseases.

NEW PERIODICAL.

We have received the first number of a new periodical, entitled "The Archives for Physical Medicine and Medicine Technology" *(Archiv für Physikalische Medizin und Medizinische Technik)*. The Editors are Dr. H. Kraft, of Strassburg, and Dr. B. Wiesner, of Aschaffenburg, and they are assisted by numerous influential collaborators.

We welcome this Journal, and wish it success. The number contains an interesting case by Professor Hildebrand and Dr. Hess of X-ray Photography of the Base of the Skull, illustrated by a case of tumour of the brain, causing changes in the sella turcica, which are clearly visible in the print which accompanies the paper. An X-ray picture of a normal skull taken in the same position is given for purposes of comparison.

The paper should serve to draw the attention of radiographers to the importance of further efforts directed to the X-ray diagnosis of morbid conditions within the skull. In spite of the disadvantages due to the homogeneous character of the cranial contents it is becoming apparent that the diagnosis of cerebral tumours and of cerebral hæmorrhage is not altogether beyond the scope of X-ray photography.

Although, so far as we know, nothing has been done in this country in the X-ray examination of cases of cerebral hæmorrhage, the attempt has been made abroad with a certain degree of success.

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Fourth Annual Meeting of this Society was held at 11, Chandos Street, W., on Friday, January 26th, 1906, at 8.30 p.m. The President, Dr. DONALD BAYNES, in the Chair.

Present:—Thirty-two members and twenty visitors.

The minutes of the Thirty-third Ordinary Meeting were read and confirmed.

Dr. W. J. Morton, of New York, was unanimously elected an honorary member.

The following gentlemen were also unanimously elected ordinary members:—A. E. Barclay, M.A., M.R.C.S., Prestwich, Manchester; W. J. S. Bythell, B.A., M.D., etc., Prestwich, Manchester; J. Gibson Graham, M.A., M.B., C.M., Glasgow.

Drs. Deane Butcher and E. S. Worrall were appointed Auditors for the 1905 Accounts.

Drs. Knowsley Sibley and Alpress Simmons were appointed scrutineers for the annual election of officers, which was then held.

The Officers for 1906, as suggested by the Council, were unanimously elected, except for a single alteration on one voting paper.

Officers for 1906:— *President:* J. Hall-Edwards, L.R.C.P. Edin. (Birmingham). *Vice-Presidents:* Samuel Sloan, M.D. (Glasgow); Chisholm Williams, F.R.C.S.E. *Council:* J. Allan, M.B., C.M. (Chislehurst); David Arthur, M.D.; G. B. Batten, M.D.; John Berry, M.R.C.S. (Ramsgate); W. Ironside Bruce, M.D.; W. Deane Butcher, M.R.C.S.; R. H. Cooper, L.S.A.; G. H. Graham, M.D.; A. Stanley Green, M.B. (Lincoln); W. S. Haughton, B.A., M.B. (Dublin); H. McClure, M.D.; A. D. Reid, M.R.C.S.; W. Knowsley Sibley, M.A., M.D.; James Taylor, M.R.C.S. (Bristol); C. A. Wright, F.R.C.S.E. *Treasurer:* Donald Baynes, B.A., M.D. *Honorary Secretaries:* R. Morton, M.D.; W. Kenneth Wills, M.A., M.B. (Bristol).

The retiring President, Dr. Donald Baynes, after thanking the officers and members for their support during the past year, vacated the chair in favour of the newly-elected President, Mr. J. Hall-Edwards, who expressed his thanks to the members present for the honour conferred upon him in selecting him as their President.

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It was proposed by Dr. Horace Manders, and seconded by Dr. Knowsley Sibley, "That the thanks of this Society be tendered to the President and Officers for their services during the past year."—Carried unanimously.

The President then called on Mr. Donald Armour to read the Annual Address which will be found in extenso in this number.

At its conclusion it was proposed by Dr. Donald Baynes, seconded by Dr. Lewis Jones, "That a hearty vote of thanks be accorded to Mr. Donald Armour for his able address." This was carried unanimously.

The meeting then adjourned.

* * *

The Annual Exhibition and Conversazione was held at the same time and place. There were sixteen exhibitors—an increase of six on the previous year, and the exhibition was attended by a large number of members and visitors.

NOTICES.

Members taking part in discussions or making remarks on papers, etc., are earnestly requested to give their notes on same to the Secretary at the end of evening, so that the proceedings may be complete and not delay the prompt publication of the Journal.

* * *

Publications.

17.—The proceedings shall be published in such a manner and at such times as the Council may direct. A copy shall be forwarded to each Honorary and Corresponding Member of the Society, and to every Ordinary Member whose subscription is not more than one year in arrear. Fourteen days' notice should, whenever possible, be given to one of the Secretaries by any member who wishes to show a clinical case or to make a communication to the Society. A copy of the paper in a form fit for publication in the proceedings must be furnished at the same time. The paper shall be the property of the Society for publication in the proceedings, without prejudice to the author's right to reprint or insert in any recognised medical paper or periodical. In all such cases the author shall state that the paper was read before the Society.

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BRITISH ELECTROTHERAPEUTIC SOCIETY'S ANNUAL EXHIBITION.

This was held at 11, Chandos Street, W., on January 26th and proved a great success.

Messrs. BARKER, of Regent Street, showed their excellent Vibratory Massage machine, which was described in a recent issue.

Messrs. HARRY W. COX, Ltd., of 1a, Rosebery Avenue, E.C., had a good display of therapeutic apparatus. They exhibited among other things one of their portable coils fitted with a new platinum contact breaker (invented by Mr. Cox) which, when working with a 12-volt accumulator, gave a good torrent of sparks.

They also exhibited one of their 12-inch coils which was worked with the Mackenzie-Davidson Interrupter. The results obtained with this coil were most excellent.

This firm also exhibited a new Tube Box which has been specially designed by Dr. Graham and Mr. Cox for therapeutic and radiographic purposes and entirely protects the operator from the rays. It is so arranged that the tube can be adjusted so that the anode is exactly opposite the aperture in the box. They also exhibited Dr. Butcher's Therapeutic Shield fitted with an arrangement for the treatment of ringworm by the aid of Sabouraud's pastilles.

This shield appears to us to be decidedly one of the best in the market, combining, as it does, the qualities of simplicity, efficiency, and cheapness.

Mr. A. E. DEAN, 82, Hatton Garden, showed the new apparatus for measuring and controlling X-rays designed for treatment by X-rays, and known as the radiogenometre. The switchboard is made of marble and is provided with resistances for motor and coil, volt and ammeter, fuses, lamps, and an improved form of starting switch which is fitted with an electro-magnet which at a predetermined moment releases the switch and stops the current to the coil. The board has in connection with it a very strongly made interrupter of the plunger type The interruptions occur within an iron cup, and the mercury and spirit can be controlled as to quantity and condition. The plunger is divided so that the stroke can be ascertained.

Attached to the spindle of the interrupter is a tachymeter fitted with an automatic switch.

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The object of the tachymeter is to register the number of discharges which reach the tube, and an automatic switch in connection with it stops the mechanism when a prearranged number is reached. The tube is mounted on a framework, and is entirely enclosed in a lead glass shield, supported in such a way as to give universal movements. In the front of the tube is a fitting which takes the treatment tubes, and if desired a radiochromometer of special design can be brought into the path of the rays, so that the quality of ray being used may be ascertained. Attached to the framework is the soupape or valve, a milliampèremeter, and a spark gap. This is a new departure, inasmuch as the actual alternative spark is read off on a quadrant, at a distance from the place where it occurs.

An interesting feature of the exhibits was the display in the library of the chief works issued on Electrotherapeutics, Radiology, and other medical subjects, by GEORGE E. DEED, of 7, Belgrave Street, Argyle Square.

The apparatus exhibited by the ELECTRO-MEDICAL SUPPLY CO., Ltd., 61, New Cavendish Street, consisted of:

1. A new X-ray Compressor, by which the body may be compressed either by a canvas belt tightened by lever and locked by spring catch, or by a heavy weight being allowed to rest upon it. An inflated bag is placed under the weight or under the canvas belt, if further compression is required. The tube holder is arranged so that diaphragms may be used in conjunction with any tube employed for therapeutical work, the holder itself acting as an X-ray-proof screen in every part, except where the diaphragm with window is fitted. The apparatus may be fitted to any table, and it is most convenient in use, any adjustment of the tube is quickly and easily made, provision being made for this purpose.

2. A Direct Current Transformer for light and cautery, working with hammer interrupter. The platinum points on the interrupter are self-adjusting, and an ample condenser is provided, so that there is no wear through sparking. The rheostats are operated through rotary handles, provided with scale and indicator. All the parts are very accessible, and may be inspected or adjusted without difficulty.

3. A new Jet Interrupter, using only 2½ lbs. of mercury. The jet is so arranged that there is practically no mercury spray produced while it is working, and therefore the mercury does not form an emulsion with the petroleum, hence it runs for a very long time without attention, and even when it is dirty the removal of two wing nuts allows of the withdrawal of the moving parts, and the small quantity of mercury can be cleaned in a few minutes. Special split and tapered contacts are used, which make the interruptions regular and

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even, so that there is no flickering of an X-ray tube worked with this interrupter. It is specially suitable for low voltages and for use with batteries.

Other apparatus exhibited included switchboards for galvanisation, faradisation, sinusoidal treatment, etc., Finsen lamp, galvanic and faradic batteries, rotary transformers for light and cautery, three-phase treatment and vibration; accumulators for cautery and light, and a selection of electrodes, cautery points, and illuminating apparatus.

Mr. C. M. HOLMQUIST, of Edgware Road, exhibited a semi-reclining Electric Light Bath, which has an adjustable deck-chair couch. All the fittings are detachable. The interior is lined with opal and aluminium, so that it is very easily cleaned.

He also exhibited the Uviol Mercury Vapour Lamp, a new generator of ultra-violet rays for Finsen treatment. This lamp gives an absolutely steady light and consumes only 2 to 3 ampères of current. It requires no cooling device or trimming, is simple in manipulation, and has a long life.

Messrs. ISENTHAL & Co., of 85, Mortimer Street, showed a very interesting general exhibit, among which were several new and useful pieces of apparatus. The most conspicuous were:

Their new Vacuum Oscillograph, mounted in case with revolving mirror. The applications of this simple and handy instrument are very numerous, especially to those interested in the forms of electric discharges and currents.

A new Vacuum Milliampère Gauge for measuring the weak currents passing through vacuum and Röntgen X-ray tubes. The gauge is a modification of the oscillograph, and consists of a tube, on which a scale in milliampères is marked. The calibration is individual for every gauge, and is effected by means of a high potential battery, so that the readings are correct. This instrument seems to avoid the sources of error, which are common to the many types of electrical galvanometers or milliampèremeters hitherto employed in the secondary circuit.

Several new types of Hot Air Douches for direct attachment to vibrator motors, or containing their own motors for hand use or suspension.

A new Suction Electrode for use in connection with vibratory massage.

Improved Electric Heating Pads, to take the place of the ordinary hot compress.

Electrically Heated Sterilisers of all sizes and patterns.

Moving Coil Milliampèremeter, Ammeter and Voltmeter, Laboratory Resistances.

Photo-Cystoscope, Cystoscopes, and Urethroscopes.

They also showed the Uviol Mercury Vapour Lamp.

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Messrs. KRUPKA & JACOBY, 61/62, Watling Street, E.C. The Multiplex Electrotherapeutic Apparatus, consisting of a pedestal surmounted by an electro-motor fitted so that it can instantly be connected, by means of its flexible shaft, to any of the instruments used in connection with massage and surgery.

The motor is also used for rectifying current for use in faradisation, galvanisation, electrolysis, cautery, and voltaisation with pulsating continuous current. For lighting surgical lamps, a special arrangement is provided within the pedestal and connections are also fitted for using Dr. Schnee's four-cell baths. All operations are controlled by separate panels, which are mounted on three sides of the pedestal.

Full set of surgical instruments, including saws, trephines, drills, head and hand lamps, etc.

Massage, high frequency, special universal instrument "Tremolo."

Table Multiplex Apparatus, fitted with air pump for pneumatic treatment.

Portable Electro-Motor, in carrying case.

The stand was illuminated by means of the high efficiency "Tantalum" lamp.

Mr. LESLIE MILLER, 93 & 95, Hatton Garden, showed:

1. A Step-up Transformer, with his patent jointless-section method of winding the secondary, and having a closed iron magnetic circuit like the transformers used for electric lighting. This raises the tension in the streeet mains to about 150,000 volts (8-inch spark in air), and when arranged with an aluminium valve cell in part of the primary circuit to stop the current in one direction, affords a powerful means of working an X-ray tube from an alternating current supply without any interrupter.

2. Jointless-section X-ray Coil, in portable case.

3. An Electric Lantern, with opal glass front, for displaying X-ray negatives to advantage.

4. Alternating Current Transformers, either for generating ozone or for cautery purposes, worked from the continuous current at 240 volt mains by means of a special form of Wehnelt break.

5. Zinc and Copper Wire Spiral Electrodes, made and used by Dr. Lewis Jones, for the treatment of ringworm, rodent ulcer, etc., by cataphoresis; and the machine for winding the electrodes.

6. A Condenser Discharge Ultra-violet Lamp, for skin treatment.

THE MEDICAL SUPPLY ASSOCIATION, of 228, Gray's Inn Road, exhibited two coil installations, viz., a 16-inch coil and a

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10-inch portable coil, each working at option on low voltage (accumulators), or directly from the main continuous current of 240 volts. The Gaiffe Autonome Mercury Jet Interrupter was used in each case, so that one could see that this interrupter serves equally well for low or for high voltages.

The Belot Shield, already described in the October number of *Electrology and Radiology*, attracted attention.

A new arrangement fitting this shield was shown. It is termed the Gaiffe-Beclere Chassis. Fitted to the front of the shield it permits the operator to cut off more or less light by a screw adjustment of two shutters serving as a diaphragm. By this means radioscopic examination of the chest can be facilitated, because the X-rays can be focussed on a small area (as for instance a suspected area of the lungs), and the light can be cut off from the adjacent parts.

The Belot Radiochromometer.—This is a radiochromometer made on the Benoist scale, but so arranged that the observer looking through a darkened case or box held in the hand sees an illuminated space at the end nearest the focus tube. The upper and lower halves of this space show different depths of shadow. A sliding arrangement is moved until these shadows are identical in depth. Then on looking at the front of the apparatus the indicator will be found to point to the number indicating the Benoist radiochromometric scale corresponding to the rays emitted by the focus tube.

This seems the simplest and easiest radiochromometer yet devised and the hands are fully protected from the X-rays when the operator is using the instrument.

The Medical Supply Association again showed their Chabaud tube, to which Mr. Hall-Edwards referred at Leicester (page 227, October number of *Medical Electrology and Radiology*).

The peculiarity of this tube is that it can be kept working all day long with the anode incandescent, yet without any lowering of the vacuum.

The vacuum can easily be lowered when desired by heating the osmo-regulator attached to the tube. If the statements made concerning the length of life of this tube are correct, it is obviously a focus tube deserving of attention. The radioscopic effects of this tube were exceedingly good.

Messrs. NEWTON & Co. exhibited an Electroscope, which they are just engaged in bringing out, for directly measuring the X-ray energy given out by a tube at any given time. This piece of apparatus has been devised by Dr. Milton Franklin, of New York, and has already been used to some extent in America. It consists of a rectangular brass box with lead-glass windows, which is divided into two compartments by an ebonite partition. A brass rod passes down the

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centre of the box, leaving a ¼ inch gap in the centre of the lower compartment. Opposite this gap is a window covered with a lead shutter by which the X-rays can be admitted and cut off at any instant. A filament of gold leaf is attached to the rod in the upper compartment and can be observed by a small telescope. When the instrument is used the gold leaf is charged till it is widely diverged. The X-rays are then admitted by opening the lead shutter, and, falling on the gap, ionise the air and gradually discharge the electroscope. The gold leaf passes in front of a pair of indices in the telescope, and the rate of movement can be accurately determined by the aid of a stop watch. One advantage of this method is that it measures exactly what the tube is giving out at any instant, quite independently of the amount of energy which is put into it. Dr. Franklin has given Messrs. Newton & Co. the sole rights of this instrument for the United Kingdom and Europe. Messrs. Newton & Co. also exhibited an 18-inch Spark Coil, which they have just constructed for the Lancaster Infirmary, to work from the 240 volt mains, with an electrolytic interrupter. They also showed a portable Apps-Newton Coil and one of their cheap pattern 10-inch coils, also a variety of X-ray tubes, etc.

The Sanitas Electrical Co., Ltd., of 7a, Soho Square, showed a new Patent Faradic Coil—new on account of the ingenious method by which the number of interruptions can be regulated. Instead of the usual vibrating hammer interrupter this coil is fitted with a kind of double paddle, operated by a hair spring and a magnet. This paddle is allowed to vibrate between a movable contact and a fixed contact, and the number of interruptions is most accurately controlled between about 50 per minute and 1,000 per minute, by altering the distance between the two points.

To regulate the strength of the faradic current, the secondary coil is moved over the primary by the turning of a handle, while the latter is itself fitted with a variable switching device for altering its windings.

Another new apparatus exhibited was a Portable Transformer for cautery and light. The rheostat for cautery enables any current to be obtained up to about 30 ampères, while the rheostat for surgical lamps gives perfect regulation up to 25 volts. These two rheostats, together with necessary switches, etc., are mounted on the white marble top of a polished box. The current taken from a 200-volt continuous main is about 2 ampères, so that a great saving of energy is effected.

In addition to one of their Standard Vibratory Massage appliances, the same company exhibited a specimen of a new

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and much smaller appliance for the same purpose, with motor arranged on its own base, movable in all directions, with rheostat beneath. The Pneumatic Ear Massage apparatus was shown in operation with the same motors.

Other exhibits were a "Combined" Battery and White Marble Switchboard for galvanisation and faradisation, with new triple-reading milliampèremeter, the actual reading in use being shown by a figure on the dial, automatically; also "Wodal" Interrupters and Light Baths, new High Frequency Table, four-cell Bath, etc., etc.

Mr. K. SCHALL, 75, New Cavendish Street, exhibited Dr. Morton's new portable switchboard for galvanisation electrolysis, and faradisation. A new Compressor with cylinder diaphragm for taking X-ray photographs and for therapeutic purposes. A new type of Wehnelt Interrupter; a spark coil giving 20 inch sparks with a current of only 100 volts and 1·5 ampères. Kienboeck's new Chromoradiometer. Johannsen's Universal Vibrator, and his well-known transformers and switchboards for galvanisation, sinusoidal currents, cautery, etc., etc.

The principal feature of W. WATSON & SON'S, High Holborn, exhibit consisted of their new Intensified Induction Coil. In external appearance the instrument resembles an ordinary induction coil, the distance between the secondary terminals being 12 inches, although a discharge of 18 inches can be obtained from the instrument with safety. The principle of the Intensified Induction Coil lies in the exact and rational measurements of the magnetic and inductive quantities. In consequence of this, the Intensified Induction Coil will produce, and pass through a X-ray tube, impulses which a larger induction coil by reason of its disadvantages is unable to do. The current intensity obtained from the Intensified Induction Coil is higher than an X-ray tube of any construction can require; in short, the maximum fluorescence and photographic effects are not controlled by the capacity of the coil, as is usually the case, but by the quality and condition of the X-ray tube. It is provided with a sub-divided primary, in order that its capacity may be altered to produce the best results with various forms of interrupters. This coil only occupies the space of an ordinary 12-inch spark coil, although the energy produced from it is greater than that which can be obtained from a 20-inch coil.

This firm also exhibited the various appliances for protecting the body from the effects of the rays, such as opaque aprons, gloves, spectacles, etc.; also bi-cathodal tubes, hot air douche, etc.

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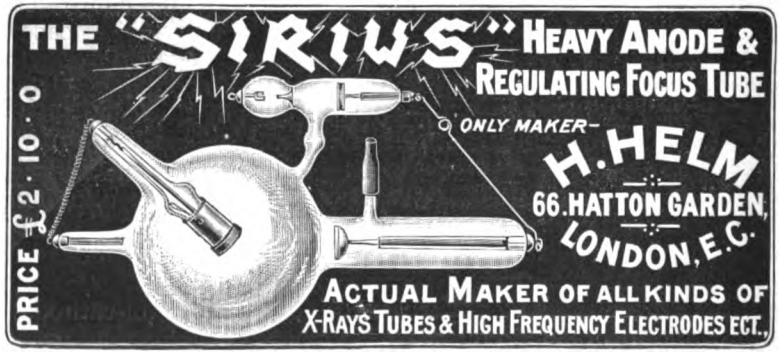
Messrs. WARD & NEWMAN, of Ley Street, Ilford, exhibited a cheap line of electro-medical batteries, consisting of:

Constant Current Sets, with twenty dry cells (Hellesen's), in case, with current collector, reverser, and electrodes of various sizes and cords, complete and ready for immediate use; these cells usually last about two years, with a fair amount of use.

Electrolysis Sets, in similar smaller cases, with collector, strap electrodes, and needle holder.

Lighting Batteries, for small surgical lamps (4 or 8 volt), and Faradic Coil Sets with electrodes of various kinds.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ONLY MAKER-
H. HELM
66. HATTON GARDEN, LONDON, E.C.
PRICE £2·10·0
ACTUAL MAKER OF ALL KINDS OF X-RAYS TUBES & HIGH FREQUENCY ELECTRODES ECT.

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MEDICAL

Electrology and Radiology.

No. 3. MARCH, 1906. Vol. VII.

THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS BY THE RÖNTGEN RAYS.

In the *British Medical Journal* for March 17th Dr. A. Stanley Green returns to the attack in a letter under the above heading, in which he says that he would be very glad to meet Dr. Theodore Williams at any of the Societies in London if he would bring some early cases and submit them to an examination by several physicians, and compare the results with those obtained by his X-ray examination.

He stipulates that for the early detection of phthisis by X-rays the examination must be thorough, and he defines the position as follows:

1. The screen examination must be carried out in a perfectly dark room; the light in the tube must be under such perfect control that slight variations in transradiancy can be easily detected; the patient must be examined "screen to back," "screen to chest," and "lateral oblique"; if the screen is covered with ground glass the movements of the diaphragm can be recorded and measured, and any shadows that are seen can be roughly traced and compared with those seen in the skiagraph.

2. The skiagraph must be taken, developed, and interpreted by the expert himself; he lays stress on this because he is satisfied that a good deal can be seen in the early stages of development that is difficult to detect in the fixed plate, and this is especially the case in the early cases where the lesion is limited to one apex. He does not wish to suggest for one moment that the methods of examination employed by others are not thorough, but he knows that in many clinics the development is left to others.

Dr. Stanley Green maintains the importance of "unilateral limitation of movement of the diaphragm," as the earliest sign of pulmonary tuberculosis, and generally shows himself to be a stout advocate of the superiority of X-ray examination as against a reliance upon the highly uncertain methods of auscultation and percussion for the detection of early changes in the lungs. Most of our readers will agree with Dr. Stanley Green, and will wonder what the older

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school of physicians hope to gain by resisting the progress of new scientific methods, and rejecting the use of X-rays in the diagnosis of chest diseases. A physician who would study X-ray work seriously and would take X-ray pictures of all his chest cases, stereoscopically in preference, would soon secure a leading position as an authority on diseases of the heart and lungs. In a slowly progressive disease like pulmonary phthisis a series of X-ray photographs of the chest taken at stated intervals would be of high value as a record of the progress of a case.

Whatever may be the ability of trained observers to make a successful diagnosis of the condition of the lungs from the data gleaned by auscultation or percussion, it still must be quite manifest to every open-minded medical man that the additional information to be acquired by X-ray photography may be of prime importance. We have seen a skiagram of a chest which showed both pulmonary apices stuffed with tubercle, and yet a physician of standing who had examined the case had stated that he was unable to say whether the patient had phthisis or not. Instances of this kind must be quite painfully familiar to all who have worked at X-ray photography of the heart and lungs. We would go so far as to say that no case of doubtful phthisis has been properly examined until his chest has been submitted to exploration by the X-rays, both by the screen and by the photographic plate, and it is probable that the time is not far distant when the patient will take the matter into his own hands and insist upon being examined by the X-ray method.

THE INTERNATIONAL CONGRESS OF MEDICINE AT LISBON.

At this Congress, which is to be held between the 19th and 26th of April, provision has been made for a sub-section for electrotherapeutics. Notices of communications for the sub-section should be addressed to the General Secretary's office, *Ecole de Médecine*, Lisbon.

Meanwhile, the British Medical Association is unable to make up its mind whether to have or not to have a sub-section in the same subject at the Toronto meeting. This may be simply from traditional British prejudice against what is new, but we cannot help thinking that a more enlightened attitude on the part of the British Medical Association towards electrotherapeutics would be quite consistent with the dignity of that body.

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THE THIRD INTERNATIONAL CONGRESS OF MEDICAL ELECTROLOGY AND RADIOLOGY.

The Congress this year will be held at Milan, from the 5th to the 9th September. A strong local committee, including among others Prof. Golgi, Prof. Bozzolo, and Dr. Luraschi, has been formed, and we learn from the circular which we have received that the modern school of Italian medicine will make it a point of honour to assure the success of the Congress from a social as well as from a scientific point of view.

In the programme of subjects for discussion at the meetings we find the following interesting items:

1. "The Law of the Electrical Excitation of Nerves." (Introduced by Prof. Cluzet.)
2. "On the Excitability of Different Muscles and Nerves." (Mlle. Ioteyko.)
3. "The Fundamental Principles of Modern Electrotherapy." (Prof. Doumer.)
4. "Electricity in Diseases of the Skin." (Prof. Luzenberger.)
5. "Treatment of Surgical Tuberculosis by Currents of High Frequency." (Dr. Denoyés.)
6. "On the Measurement of Faradic Currents." (Prof. Wertheim Salomonson.)
7. "On Stereoscopic Radiography." (Prof. Guilloz.)
8. "On the Treatment of Superficial Cancers." (Prof. E. Schiff.)
9. "On the Treatment of Deep-seated Cancers."
10. "On the Action of Radium." (Dr. P. Oudin.)
11. "The Present State of Phototherapy."

During the Congress an exhibition of apparatus will be open, and excursions in and around Milan will be organised. The subscription has been fixed at 25 francs for members and 12.50 francs for associates. Only the members will be entitled to receive the publications of the Congress or to take part in the discussions.

Members wishing to read papers are invited to communicate directly with Prof. E. Doumer, at 57, Rue Nicolas-Leblanc, Lille, before the 15th August.

Applications for membership should be sent to Dr. George Herschell, 36, Harley Street, W., the Local Secretary for Great Britain, who will also receive subscriptions.

The programme of work is a good one.

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TEN YEARS' EXPERIENCE IN THE LOCALISATION OF FOREIGN BODIES BY MEANS OF THE X-RAYS.

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It is within a few hours of ten years to-day since I produced the first radiograph which proved of practical use. This was a picture—or rather I should say a caricature—of a needle in the hand, and it was productive of the first operation done in this country as a result of the X-rays. I well remember the interest this radiograph produced, and, moreover, on looking back on my work during these years the most interesting and perhaps the best work I have done has been in the localisation of foreign bodies. I trust therefore that the subject matter of this paper will interest you all, even if it should not prove of practical use to all of you.

One of the most useful and certainly the most effectual applications of the X-rays is to be found in the exact localisation of foreign bodies, the opacity of which is greater than the tissues in which they are embedded, but it is not my intention to discuss the various methods of localising foreign bodies, as these are so well known to all of you that such a proceeding would be a waste of time.

All foreign bodies whose atomic weight is greater than that of the tissues in which they are embedded are capable of being exactly localised by one or other of the methods at our command, and some substances which are more transparent than the tissues can on occasion be found, granting that the conditions are favourable.

Metals (with the exception of aluminium) are so opaque that even the smallest piece can be found in the most dense structures of the human body.

The foreign bodies which are difficult and sometimes impossible to radiograph within the tissues are splinters of wood, and thorns. In the hands these can occasionally be made out, but when situated in the thicker parts there is always much difficulty, and sometimes their delineation is a matter of impossibility.

In civil practice needles are the most common bodies to be localised by the X-ray specialist.

Next in order come pieces of steel, next foreign bodies swallowed, then bullets and air-gun pellets.

Needles are found in all parts of the body, the most common place, however (for reasons which are obvious), being the hands.

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The foot receives its full share, and most other parts an occasional visit, not even excepting the heart.

Most of the needles are accidentally introduced through the carelessness of the housewife, who appears to have a propensity for hiding them in most unaccountable places, and for placing them in positions where they are more easily felt than seen. Curiously enough she herself is the most frequent sufferent.

Over 90 per cent. of the cases which have come under my notice have occurred in women. Eight per cent. of the cases occur in married men, whose wives are from sheer carelessness responsible. One per cent. is due to pure accident, and one to *malice prepense*. Amongst the latter we have those curious cases in which the needles have been purposely inserted into the tissues or orifices of the body, or have been swallowed.

Case 1.—Ten pins were found in and around the knee-joint of a domestic servant. How the pins found their way into their respective positions I am unable to state. The patient said she had accidentally knelt upon a pin-cushion, but this did not account for the fact that the heads on the pins were below the surface of the skin.

From a considerable experience in the radiographing of needles I am of opinion that their travelling propensities have been seriously exaggerated. We have, for instance, heard of a needle which entered the foot being extracted from the gluteal region. In certain positions there can be little doubt that they have a great tendency to move, especially when they are so placed (as in the wrist) that the movements of the part tend to push them onward. When swallowed there is no accounting for their movements; but when in the limbs at some distance from a joint they will remain stationary for years without producing the slightest discomfort.

Case 2.—A washerwoman came to the General Hospital, Birmingham, with a history of receiving a portion of a needle in her hand the day previous to her presenting herself. On examining the radiograph I discovered the presence of two portions of needles, at some considerable distance apart. On drawing the attention of the patient to their existence she remembered having received a needle in her hand some twenty-five years previously. It gave her pain for a time, but had not troubled her for such a length of time that she had completely forgotten it, until I drew her attention to its presence. Undoubtedly at first the needle was in a position where every movement of the hand caused pain. It gradually settled down, and although it had only moved a short distance from its point of entrance, it had taken up a position where muscular action did not disturb it, and where its presence could not be felt. One would have imagined such a condition

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of things was almost impossible in the hand of a woman whose work involved constant movement, but the fact remained that its presence was completely forgotten until I drew her attention to it.

Two cases have come under my notice, which tend to show that as a last resource the presence of a foreign body should not be overlooked even in cases in which there is no symptom or history to call for such a conclusion.

Case 3.—A lady was sent to me by a gynæcological specialist to have her spinal column in the lumbar region radiographed. She complained of a pain passing from her left foot to the pelvis. She was an exceedingly nervous woman and had consulted nearly every specialist in London and the provinces without result. The consensus of opinion pointed to the view that her ovaries ought to be removed.

In my examination of the spine I failed to elicit any facts of the slightest importance, and having made my report to the surgeon who sent the case to me I had forgotten all about it; when one day her husband called upon me, requested that I should radiograph her foot, his attention having been drawn to this part in a conversation with an American whose wife had suffered in a similar manner, and who was afterwards found to be suffering from Morton's disease. On radiographing the foot I discovered the presence of a needle. There was no history to its having entered the foot and pressure over the spot failed to give pain. The needle was removed and the patient recovered. In this case the existence of the pain was attributed to a central lesion, whereas its origin was peripheral.

Case 4.—In this case the patient was sent to me for the purpose of having a radiograph taken of a tubercular wrist. One of her fingers had been amputated. On examining the radiograph I discovered the presence of a brass brooch pin. I arrived at the conclusion that it was not an ordinary needle from its thickness and shape. The patient could not remember the pin entering. On its removal all the tubercular symptoms subsided, and at the present time she is in perfect health, but minus a finger.

These two cases go to show that foreign bodies frequently enter the tissues under circumstances which are so common that the very memory of them soon fades, and the absence of symptoms of the existence of a foreign body is no argument against there being one. Moreover, when all ordinary methods of diagnosis have failed to elicit a fact of importance, the X-rays should be used.

It not infrequently happens that the entrance of a needle or portion of a needle into the tissues occasions but momentary pain; and should it enter a part where it can exist without discomfort its existence is speedily forgotten.

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The radiographing of needles so as to give an exact idea of their location is not an easy matter, and no pains should be spared in the operation.

Before proceeding to take a radiograph which is to act as a guide to the operating surgeon, it is necessary that the part should be carefully examined with the fluorescent screen, and that its position in relation to the palm, or the back of the hand should be made certain.

In my experience exact localisation by measurement is not the best method of procedure.

There are many points in the search for needles, even with the aid of the most perfect radiograph, which call for more than passing attention. I am unable to recall the number of times a needle has been missed by the operating surgeon, when he has had at his disposal the most perfect radiograph, produced under the most perfect and scientific conditions.

After acting as looker-on at hundreds of operations for the removal of needles I have arrived at the following conclusions: As far as is possible, without running the risk of doing permanent damage to the limb, the incision should be so made that it will cross the needle at some point, or, in other words, it should never be made in a direction parallel to the needle. The fingers should be used as little as possible, and a careful dissection, without disturbing the parts, should be persevered with until the presence of the needle is made manifest. Undue manipulation is a mistake, which can only end in disappointment. By its adoption I have frequently seen a needle pushed from its original position into another of which no record existed, and the finding of it consequently involved a lengthy operation, not to the benefit of the patient; and ending in the production of anything but a pleasant state of mind to the operator.

The most successful method is to perform the operation under such conditions that a radioscopic examination can be made from time to time during the procedure. This is best done by using a special table with a top transparent to the rays, and with a tube arranged beneath in such a manner that the current can be switched on and off as desired.

The centre of the top of the table should be made of some transparent material, preferably of aluminium, which can be easily rendered aseptic. The X-ray tube is held in position beneath this, and above the table should be suspended a group of electric lamps and a reflector, capable of giving a good and sufficient light whilst the operation is in progress. This arrangement is the most perfect one, as the fluorescent screen can be used from time to time with but little inconvenience to the operating surgeon. The only drawback to this method is

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that the operation has to take place in a dark room and by artificial light.

If, however, three "Nernst" lamps be used instead of ordinary incandescent ones the light will be amply sufficient, and will as nearly approach daylight as is possible.

Up to a short time back the main difficulty in using these lamps was that they took about half a minute before lighting up after being switched on, but recently a new lamp has been introduced which lights at once.

In order to minimise the risks of producing an accidental dermatitis upon the operator, three sides of the tube should be protected by means of wooden screens lined with sheet lead.

This table placed by the side of, or at the end of a couch may be used for the removal of any foreign bodies contained in the limbs, and under exceptional circumstances even in the head and neck. It is a most useful piece of apparatus in a large hospital, and might even be used in base hospitals at the seat of war, with obvious advantage. It removes the difficulty experienced in the finding of needles, and inasmuch as it can be easily rendered aseptic and is rigid, it has none of the drawbacks of the localising couch.

Mr. Mann, of the Middlesex Hospital, has invented an instrument which is of great help in the localisation of needles in the hand. It consists of a wire arrangement which clips upon the hand. On the front it is furnished with two arms which carry at their free ends two pieces of wire, which slide in and out at the ends of the free arms.

The ends of these movable wires between the arms are furnished with arrow heads whilst the distal ends are furnished with metal balls. These indicators can be approximated to one another. A spring arm on the back of the instrument carries a straight steel bar with small metal balls at either ends. This bar is so arranged that by means of an adjustable sliding arrangement it can be so fixed that at the distance of the thickness of the hand it can be brought into a straight line, between the two arrow heads upon the front arm of the instrument. Once having been fixed upon the hand in this position with the aid of the fluorescent screen it is only necessary to draw a straight line with a skin pencil between the two arrow heads.

This line will not only mark the exact position of the needle but will indicate its length granting that it lies parallel to the surface. In using this instrument no idea of the depth of the needle from the surface is obtained; this must be arrived at by other means.

Another method of localising needles is to take a pair of stereoscopic pictures and to examine them in the Wheatstone's reflecting stereoscope.

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It occasionally happens that a needle in the hand has entered the sheath of a tendon, or even a tendon itself. In either of these positions it is exceedingly difficult to find, especially when only a short length is present.

Tendons can only be cut across at considerable risk; the search in these cases therefore has to be conducted with the finger. This method, however, should only be resorted to when every other has failed. Experience in the search for needles contributes largely to success; as also do an equable temper, and a disposition for painstaking perseverance. A hurried search even with the aid of the most perfect radiograph invariably ends in disaster, and especially when dealing with the hand. It must be remembered that a slashing operation is likely to end by producing more permanent injury to the limb than would have been brought about by the continued presence of the needle in the tissues. Short pieces of needle, from an eighth to a quarter of an inch in length may frequently be left in the hand, with an almost absolute certainty that they will not be productive of harm.

The position of the foreign body, taken in conjunction with the work followed by the patient, must act as a guide to the surgeon in deciding whether to resort to operative procedure, or to leave the parts undisturbed. Many cases have come under my notice where needles have lain in the tissues for years without producing any unfavourable symptoms.

Operation should not be resorted to without due consideration, and as delay is not dangerous there is no reason why (in a large number of instances) the needles should not be left until symptoms of sufficient gravity call for their removal.

In dealing with needles embedded in the arms or legs the Mackenzie Davidson method may be used with success, and, curious as it may seem, they are frequently found with greater ease than when they are located in the hands, wrists, or feet. The parts mentioned are so closely bound together that unless the incision crosses the needle at an angle, one may be within a fraction of an inch of it without being aware of its presence, whilst when it is situated in soft and yielding muscular tissue it can be detected with the fingers with comparative ease. Having carefully made a dissection in conformity with a perfect localisation, and being aware that one is in the immediate vicinity of a needle, the telephone probe may occasionally prove of assistance. This, however, must not be relied upon, as the inclusion of the thinnest possible piece of tissue between the probe and the needle will render its assistance of no avail.

I have frequently been made aware of the near presence of the needle, or piece of steel, during operation by observing a curious darkening of the tissues in its immediate vicinity;

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indeed this appearance is so common that to an extent I have learned to rely upon it.

It occasionally happens that when a lengthy piece of needle is accurately localised in the muscles, it can be pushed through the skin with or without an anæsthetic, and be extracted without using the knife.

This procedure must, of course, be carried out with the greatest possible care, or there is more than a chance that the needle may be broken during the operation, and the last condition be thus rendered worse than the first.

Case 5.—A case in point: Some men were larking in a public-house, when one drove a complete needle into the biceps of another. A radiograph showed the whole needle to be lying almost transversely in the belly of the biceps. Under an anæsthetic the two ends of the needle could be made out and the surgeon squeezing them between his fingers the point of the needle entered his fingers. Continued pressure upon the eye pushed the point sufficiently far through the skin to enable it to be grasped with a pair of "Spencer Wells" forceps, when it was pulled from its position without difficulty.

Fragments of Metal.—Next in importance and in the number of cases which present themselves is the localisation of pieces of iron, steel, and occasionally brass and other metals.

With the exception of aluminium, all the commoner metals are far more opaque to the X-rays than the tissues. Unlike needles, cases of retention of pieces of metal occur much more frequently in men than in women—blacksmiths, strikers, and metal turners being the usual recipients of such missiles. Fragments of steel occasionally fly off with such an an amount of force that they may enter several inches into the tissues, and an exact localisation may be rendered necessary before they can be extracted. Their most common situation is, of course, in the hand, and the remarks made about the removal of needles from this locality apply equally here; there is as a rule, however, less danger of moving them during the manipulation necessary to an operation.

Frequently very small pieces of metal in the hands cause considerable pain, and especially is this the case when they are so situated that the patient's work involves pressure over them.

These, of course, must be removed, and as the hands of such workmen as receive them are exceedingly hard, the process of finding such a small fragment, even after the most careful localisation, requires the greatest possible care, and a considerable amount of patience.

Fragments of steel not infrequently pass through the clothing and sometimes carry shreds, or small piece of the material into the tissues with them. These set up much

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irritation, and it will be frequently found that a severe cellulitis following such an injury, is due to their presence.

Case 6.—A gentleman was watching some road-mending operations, in which a heavy cold chisel was being driven into the roadway. A piece of steel from one of the sledge-hammers entered his thigh, passing through his trousers, pants, and shirt. A severe cellulitis followed the accident. Localisation by means of the X-rays showed the presence of a piece of steel, of the size of a sixpenny piece, in the muscles of the thigh.

On cutting down upon it a fragment of cloth was found lying by its side. On the removal of the steel and cloth the cellulitis quickly subsided, and the patient made a rapid recovery.

In this case (owing probably to its shape) the fragment followed a most tortuous course, and could not be felt with a probe. To have found it without employing the aid of the X-rays would have been almost impossible.

There is no difficulty in radiographing pieces of metal, and no special method is required.

Pieces of Glass.—Glass is comparatively opaque to the X-rays, hence its presence in the tissues can be detected if due care be taken in the operation. In thin and small pieces it is only slightly more opaque than bone, hence a very sharp negative is required to render its presence or absence a matter of certainty. In the majority of instances only a small piece is present, and very frequently when its presence is suspected it is found to be entirely absent. The detection of large pieces is a matter of comparative ease, but when small splinters enter the hands the greatest care must be exercised or they are likely to be missed. In the first place, no radiographic negative is of value which does not show the most minute details of the bones, for if the fragments should be situated in such a position that it is necessary to photograph it through the bones themselves (as often happens), a small piece of glass may be overlooked, unless every detail of their structure is made clear.

The limb or part should always be radiographed from two or three points of view, and a most careful examination of the negatives should be made before a decision is arrived at. It is unfortunately impossible (owing to the loss of detail in our present methods of reproduction) to produce a plate which will show a small piece of glass through bone, indeed it frequently happens that it is only in the negative that its presence can be detected.

Its exact localisation is frequently a matter of the greatest difficulty, and an operation for its removal must only be undertaken after due consideration of the *pros* and *cons.* of the case. I may here mention that cuts in the hands, made

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with glass, appear to give more trouble than incisions made with any other material. I am unable to give a reason for this, unless it be that microscopic pieces, which it is impossible to detect even by the X-rays, may exist in the wound and be the cause of the mischief.

Various Foreign Bodies which may enter the Tissues from outside sources. – Quite a large number of articles and substances may enter the tissues under peculiar circumstances.

I have located a piece of slate pencil 3 inches in length in the buttock of a boy, who sat down suddenly upon his pocket which contained his writing materials. Tacks, brass buttons, small pebbles, beads, etc., often find their way into the tissues, with the aid of the toy-pistol, or of a small cannon. Fish-hooks, crochet-hooks, and portions of knitting pins, get there accidentally and a multitude of other unconsidered trifles may find a home in the tissues under circumstances too numerous to mention.

All of these bodies and many others can be localised by means of the X-rays.

The rules laid down for the finding of foreign bodies in general apply to all, and the only advice I can give, is never to say off-hand that the entry of a foreign body is impossible until you have proved to your own satisfaction its non-existence.

Foreign Bodies Swallowed.—To give a list of the various articles and substances that may be swallowed would puzzle the compiler of a dictionary. Many of them cannot be detected by the X-rays, but some of the more commonly swallowed trifles are sufficiently opaque to be of interest to the surgeon radiographer. Under normal circumstances it may be said that anything that is small enough to be placed comfortably in the mouth may under certain circumstances be swallowed.

It is in this branch of radiographic work that the X-rays have gained some of their triumphs, and I have no hesitation in saying that through them many lives have been saved. Foreign bodies may be found in the pharynx, œsophagus, stomach, intestines, rectum, or lungs. Should they refuse to move their position can be accurately localised, and an operation made certain which previous to the discovery of the X-rays would have only been exploratory.

It may be taken as a general rule that any foreign body which can enter the stomach can be expelled through the rectum. There are, however, a certain number of bodies which stick in the œsophagus or trachea and whose presence is a great source of danger.

(To be continued.)

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NOTES AND ABSTRACTS.

The X-ray Examination of the Stomach and its Application to the Diagnosis of Carcinoma.—Holzknecht describes observations on healthy and diseased stomachs by means of X-ray examinations made after the ingestion of food containing considerable quantities of subnitrate of bismuth. It was found that much more satisfactory results were obtained if the observations were made directly by means of the fluoroscope than if photography was resorted to, because the phenomena produced were so varied in nature that continued inspection was necessary in order to obtain any insight into their import. One conclusion reached was that a stomach normal in size and position is very rarely seen. The normal type of stomach is rather small and is so placed that the pylorus forms its lowest point. The form most often observed, on the other hand, is much larger and through descent of the greater curvature exhibits a rise at the pylorus. The author explains the formation of this type of stomach by the almost universal relaxation and atrophy of the anterior abdominal muscles, induced by the habits of muscular inactivity of the present age. In this way the lower part of the abdomen becomes protuberant and the pad of the intestines on which the stomach normally rests drops down a considerable distance. The extremities of the stomach being fixed, while it is to a certain extent deprived of its natural support, the organ, which was not constituted for the purpose of standing a strain of this sort, undergoes gradual dilatation in the direction of its long axis. In other words, this is the beginning of gastroptosis, a condition which usually receives attention only when present to a marked degree, whereas naturally all intermediate stages must also exist. The author describes the phenomena attending the filling of the stomach with food as visible on the fluoroscopic screen, and explains the manner in which observations of this sort may by used for the detection of non-palpable carcinomata. Owing to the infiltration of the gastric wall with the tumour masses, easily recognisable abnormalities in the behaviour of the stomach when bismuth food is poured into it can readily be detected. Its functional efficiency can also be tested by inclosing bismuth in tiny bags of goldbeater's skin, which are swallowed by the patient. As soon as the bag is digested by the gastric secretions the bismuth escapes, an act which is readily discernible with the fluoroscope. The author considers that this method is superior to the somewhat similar one of Sahli.—*Berliner klinische Wochenschrift*, January 29th, 1906. Abstract taken from *New York Med. Record,* Feb. 24th, 1906.

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The Treatment of Heart Disease by Baths and Exercises.—At a meeting of the British Balneological and Climatological Society on January 31st, Dr. Alexander Morison read a paper on the present position of the treatment of heart disease by baths and exercises. He said that the cases of heart disease which the majority of English physicians considered suitable for treatment by baths, exercises, and climatic conditions were, speaking generally, such as could safely travel and could in no sense be regarded as seriously ill at the moment, whatever fears might be entertained for their future. These patients could be classed in three divisions: 1. Those who had not passed middle life and had moderate weakness of the myocardium, with or without irregularity of action, and without organic valvular lesion or organic disease of other organs, and who were quite free from renal disease; 2. Those who exhibited a similar degree of disordered action of the myocardium associated with valvular disease, other than aortic regurgitation, and were free from pericardial adhesion so far as could be determined; 3. Older patients with myocardial debility, without arterio-sclerosis, without organic valvular disease, without disease of organs other than the heart, and without symptoms of angina pectoris.

Dr. W. Bezly Thorne said that he was unable to perceive from any evidence disclosed by the paper to which he had listened that the opinions therein expressed were based either on facts or on definitely recorded observations. His own experience had led him to conclusions diametrically opposed to those expressed. For example, he considered that there were no cases in which the results of treatment were more strikingly satisfactory than in septuagenarian atheroma, in the graver forms of angina pectoris, and in aortic reflux. The only limit he knew to the benefit of treatment in the last two classes of cases was where there were clinical grounds for coming to the conclusion that the coronary vessels had permanently lost the qualities which would be necessary to myocardial repair. He thought that the striking difference between the results recorded by Dr. Morison and those observed by himself must be due to differences of technique. He was quite prepared to submit his records to any scrutiny which the society might think desirable in confirmation of his statements.

Dr. Leonard Williams said that he agreed with Dr. Morison's opinion that the cases suitable for treatment by baths and waters were comparatively few. He strongly deprecated the fashion which had obtained at one time of hurrying people in a more or less moribund state half across Europe in the expectation of some miraculous "cure" on arriving at their destination.

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Dr. Charles Begg (Bath) said that an experience of five years, begun at Nauheim, led him to endorse Dr. Morison's conclusions. Suggestion played a very conspicuous part in the treatment at Nauheim and was a very powerful agent in dealing with such an organ as the heart. The treatment by baths and exercise ought to take its place as a useful help in suitable cases, but it was not by any means a specific.

Dr. C. W. Buckley (Buxton) said that the result of baths and resisted exercises was to lower the blood pressure and to increase the tone of the arterioles, *i.e.*, to assist the heart's action by promoting the action of the skin. The smallest hygienic and other proceedings might tend to this end and in this sense the value of physical treatment was not to be denied in any heart trouble, and, looked at from this standpoint, the apparently irreconcilable views which had been expressed at the meeting might come into harmony.

Dr. Morison, in his reply, said that he regarded baths and exercises as occasionally a useful adjunct to more serious treatment, whereas it appeared to him that what he considered serious treatment was regarded by Dr. Bezly Thorne as a useful adjunct at times to the employment of baths and exercises.

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The Duration of the Pulses of Current through an X-ray Tube.—In the discussion which followed Dr. Reginald Morton's paper on the Ondoscope (or vacuum tube oscillograph) at the November meeting of the British Electrotherapeutic Society, it was pointed out by a speaker, though not recorded in the proceedings, that an examination of the current in an X-ray circuit, by the aid of the ondoscope and a revolving mirror, showed that the impulses through the tube were of excessively short duration, and were quite unlike the long waves of current through ordinary vacuum tubes. Since then the subject has been examined by other observers. Prof. André Broca, of Paris, made a communication to the Academy of Sciences, on the 29th of January, in which he stated that the discharge through an X-ray tube had a duration of about 0·0006 of a second, and that this duration was practically constant with equivalent sparking distances varying from 6 to 10 centimetres. B. Brunhes, in the *Comptes Rendus* for February 12th, reports that he has photographed a beam of X-rays transmitted through an aperture and falling upon a revolving disc, and that he has compared the photograph so obtained with that of a spark at a gap in the same circuit similarly reflected, and he finds that while the image of the spark is not elongated by the motion of the disc, the image

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of the X-ray beam shows a slight elongation, from which he deduces a time of about 0·0001 of a second for the duration of the discharge of X-rays by the tube.

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The Fluorescence of the Glass in an X-ray Tube.—The green hemispherical fluorescence in an X-ray tube is generally taken as a measure of the X-ray production, but recent observations show that as an indication of utilisable X-rays the green colour is not completely trustworthy. In a paper read before the British Electrotherapeutic Society at Leicester, it was pointed out by Dr. Lewis Jones that in X-ray tubes whose resistance was lower than 2 inches of equivalent spark gap the X-ray production was very small, and that when the spark gap was less than 1½ inches there were practically no X-rays produced, although the fluorescence of such tubes might seem quite satisfactory. He raised the question as to whether the fluorescence was caused by very soft X-rays which were unable to penetrate the glass wall of the tube or whether it were due to some other cause. The point has been settled by Dr. W. Seitz* by means of some observations made with the aid of tubes having an aluminium window: he found that when the vacuum in the Röntgen tube was progressively reduced, the intensity of the Röntgen rays diminished simultaneously, and that when the electro-motive force fell below 30,000 volts (equal to a little over an inch of spark gap) no X-ray effects were produced either upon a fluorescent screen or upon a photographic plate with a tube of the ordinary kind. When a portion of the glass wall of such a tube of low vacuum was replaced by an aluminium window a vigorous emission of X-rays could be observed, but they were of such a quality as to be completely absorbed by the glass of the tube. The photographic action of these rays was found to be strong, as was also their action upon bacteria. These soft X-rays penetrated aluminium much better than glass, but it was found that the rays generated at pressures between 1,500 and 6,000 volts were reduced to half their amount by an aluminium film of 0·007,5 centimetres in thickness. Seitz stated that some formation of X-rays occur in tubes of very low vacuum, even at pressures as low as 600 volts, if the anticathode is sufficiently near to the cathode to receive the bombardment of the cathodal stream.

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Spark Lengths at High Potentials.—It is difficult to do more than guess at the potential differences required to produce a given length of spark in air. Many measurements have

* *Physikal. Zeitschrift*, November 9th, 1905.

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been made by different observers but their results differ widely. The form of the terminals between which the discharge takes place have a considerable influence upon its length, and the figures obtained in any given set of experiments seem to depend a good deal upon whether the terminals employed were plates, balls, points, or combinations of these. The uncertainties which surround the problem are quite natural because the measurements of electro-motive forces becomes increasingly difficult as the pressure rises higher and higher, and the stage at which a discharge changes from a brush to a spark is not always easy to determine. Fleming* writes that for sparks having lengths up to 5 or 6 centimetres we shall generally not go wrong in reckoning the voltage required to produce a spark between metal balls in air at the ordinary pressure as 3,000 volts per millimetre. Bergonié,† in discussing the probable spark length corresponding to 100,000 volts, seems to be in favour of regarding 10 centimetres of spark length as the equivalent of that potential difference. This would be in the ratio of 1,000 volts per millimetre, and is therefore lower than the estimate given by Fleming, but the latter authority specially confines his statement to spark lengths less than 6 centimetres, and it is probable that at pressures of 100,000 volts or upwards the relationship between spark length and pressure may change more rapidly than at the lower pressures. The estimate of 1,000 volts per millimetre is commonly taken as a basis in considering the potentials of the discharges of coils and of static machines, and may perhaps be fairly near the mark for long sparks. That all ordinary estimates of the potentials of spark lengths are of the roughest kind may be seen by the experiment of changing the secondary terminals of a coil. When the sparks pass from a positive point to a negative disc they may be 1 or 2 inches longer than they would be with the terminals arranged oppositely. In estimating the resistance of an X-ray tube by the alternative spark gap method the shapes of the secondary terminals should be taken into consideration.

Messrs. Newton, Scientific Instrument Makers, 37, Fleet Street, E.C., have taken into partnership Mr. Russell F. Wright (son of the late Mr. Lewis Wright, the author of "Light" and "Optical Projection," etc.), who for some years has been works' manager at their factory and head of their electrical department.

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* Cantor Lectures. 1903. On Hertzian Wave Telegraphy.

† In Bouchard's *Traité de Radiologie Médicale.*

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NOTICES OF BOOKS.

Copies of the works reviewed in these columns can be supplied by the Publishers of "Medical Electrology and Radiology."

ANATOMICAL ATLAS OF STEREOSCOPIC RÖNTGEN PICTURES. By Ernest Sommer, Würzburg. Part I. Normal Anatomy of Joints and Bones. Royal 8vo. Price 10*s*.

This is a portfolio in book form containing twenty stereoscopic X-ray photographs to show the bony parts of the normal body. They are reproduced on a reduced scale and in a nearly uniform size of about 3 inches square and are mounted on large cards which bear a full description and also a diagrammatical sketch plan of the region illustrated. When viewed with an ordinary prismatic stereoscope they not only illustrate the anatomy of the bones and articulations, but also serve as models of what a good X-ray photograph should show. One of the best gives a view of the sacrum, a region whose interpretation in X-ray photographs is by no means easy. The hip joint is well presented in two plates and the side view of the vertebræ in the cervical region is also excellent.

* * *

ARCHIVES OF PHYSIOLOGICAL THERAPY. Edited by Clarence E. Skinner, M.D. (Richard D. Badger, Gorham Press, Boston, U.S.A. Price 3 dollars [12*s*. 6*d*.] yearly.)

This monthly journal which has now entered upon the second year of its existence is worthy of the attention of English readers because of the very full abstracts which it gives of the electrotherapeutic papers which appear in the French and German special journals. Good and discriminating abstracts are also given of English and American electrotherapeutic publications, so that this journal keeps the reader informed of all that is going on in electrotherapeutics all over the world. Several original contributions are given in each number. The forms of physical treatment other than electrotherapy are also comprehended within the scope of the journal, and we commend it warmly to our readers.

Books and Journals Received.

AMER. JOUR. OF PROGRESSIVE THERAPEUTICS. Jan., 1906.
ANNALES DE MÉDECINE ET CHIRURGIE INFANTILES.
ARCHIVES D'ELECTRICITÉ MÉDICALE. No. 183, 184.
JOURNAL DE PHYSIOTHÉRAPIE. February 15th, 1906.
JOURNAL OF THE RÖNTGEN SOCIETY. February, 1906.
LE RADIUM. February, 1906.
NEW YORK MEDICAL JOURNAL.
NEW YORK MEDICAL RECORD.
REVUE DE CINESIE. February, 1906.
COMPTES RENDUS. Premier Congrès international de l'étude de la radiologie et de l'ionisation. (Paris: Dunod et Pinat, 1906.)

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Thirty-fourth Ordinary Meeting of this Society was held at 11, Chandos Street, W., on Friday, February 23rd, 1906, at 8.30 p.m. The President, Mr. J. HALL-EDWARDS, in the Chair.

Present: Twenty-two members and one visitor.

The minutes of the Fourth Annual Meeting were read and confirmed.

The nominations of T. L. Bunting, M.B., of Newcastle-on-Tyne, and A. Howard Pirie, M.D., of London, as members of the Society were announced to be balloted for at the next meeting.

The following were elected honorary members:—Donald J. Armour, B.A., M.B., F.R.C.S.; and W. Benham Snow, M.B.

The following were elected ordinary members:—Harry George Critchley, M.D., M.S.; Percy Lake Hope, M.R.C.S., L.R.C.P.; John Alex. Howard, M.D., M.R.C.S.; Arthur E. Joscelyne, M.R.C.S., L.R.C.P.; P. Habberton Lulham, M.R.C.S., L.R.C.P.; and Charles W. E. Toller, M.D.

The PRESIDENT brought forward a resolution voicing the Society's opinion that the medical application of X and other rays should only be permitted to registered practitioners.

He said: In the early days on the application of the Röntgen rays to diagnosis, accidents, often of a serious nature, served the useful purpose of suggesting their trial in the realms of therapeutics. As an example of good coming out of evil, the rays have successfully passed through the stages from diagnosis to empirical therapeutics, to experimental pathology, and lastly have reached the stage of scientific therapeutics. Many diseases are now more successfully treated by means of the rays than they can be by any other method. Ringworm and lupus may be specially mentioned. Recent experimental research has taught us something of the action of the X-rays on the blood and deeper tissues, and has led to the use of the rays in a new group of diseases in which alterations in the blood figure.

It has been proved experimentally that the Röntgen rays can cause atrophy of the testicle in the white rat, and of the ovary in rabbits; it has, moreover, been asserted that constant workers with the rays are, after prolonged exposure, rendered sterile. This property of the rays directly touches upon one of the most serious social questions of the day, and

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is in itself proof that the application of the rays should be restricted to medical men trained in radiotherapeutics.

The extreme seriousness of burns accidentally produced, and the risks of setting up X-ray dermatitis by too prolonged exposure, should be safeguarded as far as possible.

Some of our continental neighbours have already made it illegal for the rays to be used by any but qualified medical men, and at the present time efforts are being made to introduce a bill in France with this object. In this country the X-rays are used both for diagnosis and treatment by many unqualified persons, and by some of the grossest quacks.

It has been asserted by one of our leading medical journals that the use of the X-rays for the purpose of diagnosis is safe in the hands of laymen. This, however, is not correct, for inasmuch as a diagnosis can only be arrived at after a capable interpretation of the radiograph, combined with clinical observation, it follows that hasty conclusions, drawn from the radiograph alone, are in themselves a source of danger.

The taking of a radiograph is in nearly all cases only a step towards diagnosis, and the actual process must in many instances be done by, or done under the actual supervision of, the medical man, if mistakes are to be avoided.

It frequently happens that it is wise that neither the patient nor his friends should be made aware of the facts exhibited in a radiograph. Much harm may be done and difficulties may be thrown in the way of successful treatment by the patient becoming aware of his condition.

From another point of view a radiograph is a document consisting of something taken directly from the patient—it is something of the personality of the patient, and should be kept as secret as any statement made by the patient. There is nothing to prevent the quack from dealing with radiographs as he likes.

Passing to the application of radiotherapeutics, we enter further into the domain of pure medicine and practice. There now exists a radiological posology, dosing precisely the quantity and quality of the rays employed. It is evident that the medical man alone can examine and settle these delicate questions.

The medical use of radiology should therefore be reserved exclusively to medical men; instead of that, it has up to the present, contrary to the law on the practice of medicine, been a free industry, open to all, without any guarantee of morality or professional aptitude, lending itself to every abuse and danger.

It appears to me that the British Electrotherapeutic Society should make the first move in this direction; I have therefore pleasure in moving the following resolution.

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Resolution.

"It having been established that the use of the X and other rays by persons without a registered qualification constitutes a grave social and public danger, and that medical men alone are capable of administering such rays to the public benefit; this Society is of opinion that the use of the X and other rays should be, by Act of Parliament, confined absolutely to registered medical and dental practitioners."

Should this resolution be passed, I am empowered by your Council to send a copy of it and my remarks to the medical Press, and to otherwise deal with it in the hope of attracting the attention of our medical members in Parliament.

Dr. W. KNOWSLEY SIBLEY, M.A., M.D., seconded the resolution. He said: The President has so thoroughly covered the ground of this resolution that there is nothing left for me to do except to formally second it. Members of this Society can fully endorse all that he has said with regard to the danger from the public in the use of rays by unqualified and inexperienced men. The reference to an Act of Parliament perhaps appears to be a little strong, and some may think it conveys merely a pious opinion. But, on the other hand, we may fairly assume that the day is not very far distant when we shall get the amendment of the Medical Acts, and a better protection of our practices. Some of us have recently been canvassing candidates for Parliament, and we have been surprised at the sympathetic reception that has been given us. On every occasion, and with candidates on either side of politics, we have found the fullest sympathy with our propositions. One of the four propositions that we placed before the candidates urged the prevention of the practice of medicine and the signing of medical certificates by unregistered men. We thought that this proposition would be one which they would all hesitate to support, but we were surprised to find that in two or three instances the candidates themselves actually strengthened the paragraph by changing the phrase, "more completely prevented," to "absolutely prevented." This was very much more than we anticipated, and if we work at it quietly and steadily we shall attain our end. I feel that this Society should be the first to take up the question of the use of these rays by unregistered men. There was a very interesting case in point at the Law Courts recently in which a medical man prescribed X-ray treatment in a case of locomotor ataxia, but left the application of the same to a firm of druggists. Ill effects resulted and the patient brought an action against the druggists, who pleaded in defence that the doctor was liable. The jury disagreed, and thus the case came to nothing, but it serves to show us the undesirability of sending our patients to unquali-

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fied persons. I second the resolution with great pleasure, and trust that a copy of it will be sent to the medical Press.

Mr. CHARLES A. CLARK, L.D.S., said: May I suggest, with respect to the mention of dentists in the resolution, that the words be amended to "dentists in practice of dental surgery"? Dental surgeons sometimes treat cancer of the breast, lupus, etc., things which should be confined to medical men. I will put that forward as an amendment.

Dr. DONALD BAYNES seconded the amendment.

Mr. STANLEY GREEN said: Why should it be in the hands of dentists at all? Have dentists had any instruction or experience in this treatment? If you say "dental surgery," it will affect men qualified in medicine as well. In my own town three men who are registered dentists are also medical men by their qualifications. Undoubtedly the great offenders in this matter are the medical men themselves. Dr. Sibley instanced a case in point. They are the men we have to fight, just as much as the lay people.

Mr. CLARK: I may explain that I use the X-rays in dentistry purely for diagnosis, and that I am radiographer to the Dental Hospital.

Dr. H. LEWIS JONES, M.A., said: I think that the wording of this part of the resolution may be safely trusted in the hands of Mr. Clark. If he gives us a phrase which satisfies him, we shall be quite safe in accepting it.

Mr. Clark's amendment was put to the meeting and carried, after which the resolution, as amended, was also put to the meeting and carried. There was a unanimous vote in each case.

Mr. CHISHOLM WILLIAMS then took the Chair, while the President demonstrated a new method of applying X-rays to lupus affecting the nose and other cavities by means of an electrodeless vacuum tube of special shape.

After the reading of the paper an informal discussion took place, and in reply to various questions the PRESIDENT said that, when using the arrangement for nasal treatment, he made use of a piece of indiarubber tube slipped over the glass, which did away with the sparking almost completely. He found that the patient could not stand heavy discharges applied in this way. He used the small solenoid of about fourteen turns and large condensers. A speaker said that two or more of these tubes could be used for as many patients arranged in series, which allowed of treating several persons at the same time. Another member said that he had used a similar electrode, but he preferred to earth the tube instead of holding it in the hand.

Mr. CHISHOLM WILLIAMS had used the ordinary high vacuum tube, and for the purpose of establishing connection with the patient was accustomed to keep one hand on the

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top of the resonator during the discharge, and to hold the electrode in the other. He had experienced no ill effects though the fingers became warm. He had treated a case of rodent ulcer in this manner by applying his thumb directly to the affected spot. He thought that Mr. Hall-Edwards's method would take a longer time.

THE PRESIDENT pointed out that his electrode was intended for applications inside the cavities of the ear and the nose.

THE PRESIDENT then read his paper on "Ten Years' Experience in the Localisation of Foreign Bodies by means of the X-rays."

At the conclusion of the reading of the paper Mr. CHISHOLM WILLIAMS said: I am sure that we are very much indebted to Mr. Hall-Edwards for his paper, and there are doubtless many members who would like to make comments upon it. With regard to the removal of foreign bodies such as needles I believe the best method to be the one I will now indicate. In the first place I always use a screen to find the needle. I often used to be asked to skiagraph the needle, and then the house surgeon would say that he could not discover it. It is absurd to show a skiagraph and then, pointing to it, say: "There is the needle." My method is, first, to clean the skin over the needle, then freeze with a little ethyl chloride; then pass a hypodermic needle and inject a little eucaine. By means of the screen the point of the needle is made to touch the foreign body. The needle thus forms a director along which one can cut down in order to remove the foreign body. He considered that in almost all cases of needles in the tissue one should be able to effect the removal without a wound being made larger than the breadth of a tenotomy knife. He once removed a bullet from a woman's shoulder by this method, although she was very stout, and the bullet was lodged on the under surface of the deltoid. As an ordinary hypodermic needle would have been too short he used a long Pravaz syringe as the director.

In one week at the West London Hospital he had seen two children, aged 3 and 4½ respectively. The younger had swallowed a farthing, and the elder a halfpenny. The screen was used to localise, and these were removed under the screen with an alligator-jawed throat forceps, which he considered to be more effective than the coin-catcher.

A private patient who had had resection of the small intestine with suture over a Murphy's button was sent to him for a skiagraph two months after operation. He was rather a nervous man, and was much interested to know how the Murphy's button progressed, so that he came regularly for examination almost weekly. During this time the button passed slowly along, but it took eight months and eleven

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days in its passage. It was identified in the sigmoid flexure a few hours before it finally passed. That it should take so long a time to pass was certainly extraordinary.

Mr. A. D. REID said that he had been much interested in the President's account of his experiences in the localisation of foreign bodies. His own work had convinced him that in practice, accurate localisation by means of the cross-thread localiser was in the large number of cases labour thrown away. One might, indeed, localise the object, but by the time the first incision was made the position of the tissues altered, and that of the needle was very likely altered too. It was astonishing to see in how many cases, after careful localisation, the object was missed. The procedure he had adopted was as follows: The patient is made to lie on the couch, with the tube placed underneath; the whole of the operation is done by the aid of the screen. He had lately made some small sterilisable screens (one of which he showed to the meeting). These screens measure about 6 inches by 4, are enclosed in celluloid, and are air-tight and water-tight. The operation, conducted under the screen, rarely occupied more than from five to ten minutes.

Mr. HALL-EDWARDS said that the localisation of foreign bodies other than in the hand (as, for example, in the limbs) might be accurately done by measurement. But in his opinion it was hopeless to attempt it. In the thigh, for instance, any movement of the patient altered the position of affairs, so that in nine cases out of ten the needle would not be found by the surgeon. There was one case in which accurate localisation was absolutely necessary, viz., that of foreign bodies in the eye. Still the removal of steel particles might be successfully done with the screen, with the aid of a small magnet carefully handled.

Mr. STANLEY GREEN agreed with Mr. Reid that in general the removal of foreign bodies should be done with the aid of the fluorescent screen. The method that Mr. Chisholm Williams suggested might appear at first sight to be a pretty one, but it was doubtful whether it would often be possible to remove a needle through such a small incision as he had advised. It was often necessary to make a considerable incision.

He was surprised not to hear false teeth mentioned among the various foreign bodies touched upon by the President. He thought that foreign bodies in the œsophagus were better removed with a pair of long forceps guided by the finger rather than with the coin-catcher.

He would like to mention one case in which the X-rays were useful, though not in the ordinary way. A nervous old lady was brought to him by her daughter, because she had swallowed her false teeth. An X-ray examination,

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however, failed to reveal them. By this her fears were somewhat allayed, and shortly afterwards her daughter found the missing teeth under the old lady's pillow!

Dr. REGINALD MORTON said that in East-End hospital work, among the enormous number of cases coming to the X-ray department, some curious foreign bodies were sometimes met with. Not long ago a child swallowed a little toy bicycle, which became impacted in the gullet. The obstruction did not prevent the child from breathing nor from swallowing milk. To extract it it was necessary to bisect the bicycle, but after that operation it was very successfully removed. The case was sufficiently curious to get into the illustrated papers. Another case was that of a child who had swallowed a brass monkey; this, however, did not require any such operation before its removal.

A recent interesting case bearing on the question under discussion was that of a baby five months old who had swallowed a pin. The pin was two inches long, and was found to be lying diagonally across the child's heart in the left bronchus. As showing the value of operating under the screen, this case was instructive. The assistant surgeon first spent two hours with the child under an anæsthetic trying to extract that pin, but without success. Two days afterwards the child was brought into the radiographic department, and by the aid of the screen the pin was extracted in two minutes.

Mr. CHARLES A. CLARK, L.D.S., said that one member had spoken of the swallowing of artificial teeth, and the failure to find them under the X-rays, and wished to point out that, because the teeth were not seen, it did not follow that they had not been swallowed. In many cases the dental support was made of aluminium, and although the presence of vulcanite on the plate might reveal the teeth, they would probably have a very different appearance from the one naturally to be expected.

Mr. J. HALL-EDWARDS, in reply, thanked the members for the patient way in which they had listened to his paper. He wished to add that the paper was anything but complete, but that it might serve to demonstrate some of the points in X-ray work which appeared to be of interest. He spoke as an X-ray specialist, and not a surgeon; but with regard to Mr. Chisholm Williams's remarks, he did not believe the use of the hypodermic needle as a director would be satisfactory, save in a very few cases. Even with the screen a needle might be difficult to find, bound down as it often was in the dense structure of the hands. If a needle is buried deeply in the centre of the palm it is a very difficult matter indeed to get it out. He agreed with Mr. Chisholm Williams in thinking that the removal of a needle from the hand of a man or a woman should not be left to an inexperienced house

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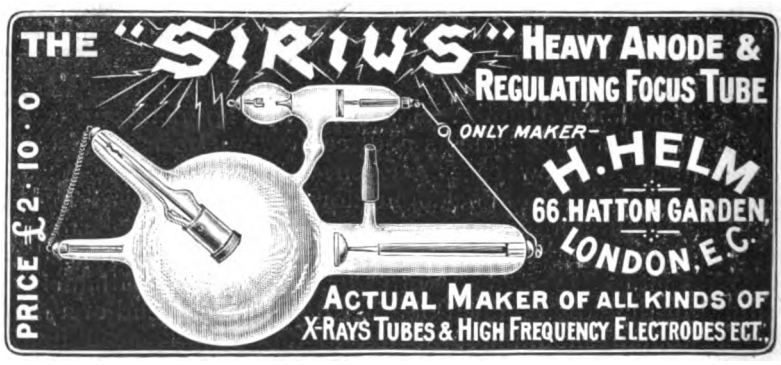
surgeon. He thought it quite as necessary to a working man that he should have a needle properly removed from his hand as that his appendix should be properly removed.

When working with the coin-catcher he did not use the fluorescent screen; he did not find it necessary. He thought the merit of a coin-catcher lay in the fact that if it did not catch the coin it caught nothing; while the alligator forceps, on the other hand, had not that merit. Mr. Reid spoke of the failure of cross-thread localisation. But why was it a failure? He could only say that in every operation he undertook in South Africa no single foreign body was ever missed. And why? Because the surgeons took his advice as to where they should go to find them. He would like to refer members to his article on South African experiences for an account of how to secure such results. Surgeons would, of course, take their own view of things. In South Africa they had never missed extracting a bullet from the skull by means of cross-thread localisation. The bullet was radiographed, the place on the skull was marked, the skull was trephined, and in the centre of the trephine hole a little cross incision was made to the specified depth, and the bullet was picked carefully out. If surgeons would follow the instructions of the man taking the radiograph there would be no failure with that method of localisation.

He purposely said nothing about foreign bodies in the eye, nor about false teeth. He would like to mention a curious case: A gentleman came to him, saying that he had swallowed his toothplate. A radiograph showed no sign of the missing teeth. A general examination of the patient, however, showed him to be suffering from acute appendicitis, for which he was sent at once on an ambulance to the hospital, and two hours afterwards his appendix was removed. Three days later his false teeth were found in his dressing-room.

The business of the meeting was then concluded.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MEDICAL
Electrology and Radiology.

No. 4. APRIL, 1906. Vol. VII.

ON THE TREATMENT OF MALIGNANT DISEASE BY X-RAYS.

In the discussion which followed the reading of Mr. Chisholm Williams's paper at the last meeting of the British Electrotherapeutic Society several interesting details of practice came up for consideration, and almost all the speakers agreed that the production of a certain degree of reaction was desirable for the attainment of a favourable result.

Dr. David Arthur contributed an interesting item towards our knowledge of the production of the X-ray burn. In the instance he related, acute dermatitis was caused by two applications of X-rays, although the applications were made at a distance of 6 inches and were not of more than ordinary duration. The tube used was one of small size and low resistance, having an equivalent spark gap of not more than 1 inch. It was excited by an 8-inch coil worked from accumulators, and the anticathode was at a red heat during the application.

The rays from such a tube must have been of very low penetration, and we may assume that they were almost entirely absorbed by the skin of the patient, and that the burn would not have been caused if the surface treated had been covered by a layer of clothing.

The conditions under which the burn was produced resemble those which were common in the early days of X-ray work, when burns were comparatively frequent. It was then observed that a layer of clothing seemed to ward off dermatitis. The reason why acute burns are now so seldom seen, although X-ray apparatus is far more powerful than formerly, has not as yet been completely explained. It is probable that the relative rarity of X-ray burns to-day may actually depend

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upon the use of more powerful apparatus, and that the large coils worked from the mains with high speed mechanical interrupters have caused the disappearance from the market of the low tubes most prone to give rise to acute dermatitis.

The early forms of X-ray tube were also constructed of very thin glass, and it may be that the thickness of the glass of modern large X-ray tubes may be an important factor in the immunity from burns of the present time. Certainly in modern practice tubes so soft as the one described by Dr. Arthur are hardly ever met with, and it would be interesting to make a series of experiments with the object of comparing old-fashioned with modern tubes, in order, if possible, to settle the question once for all as to whether dermatitis is produced by rays of special limited powers of penetration.

The use of screens or filters for X-rays seems likely to come into general use before long. An American writer has already recommended sole leather as a good material for absorbing soft rays and transmitting the harder rays unimpaired, on the ground that leather being composed of the skin of animals might be expected to absorb just those rays which would tend to be injurious to the skin of a patient. We have been informed by Dr. Reginald Morton that at the London Hospital fabrics impregnated with sodium tungstate are used with satisfactory results as X-ray filters, but one would expect that an element with the high atomic weight of tungsten (183·5) would absorb not only the soft but also the more penetrating rays which were needed for the treatment of the case.

To a certain extent it is paradoxical to recommend the production of a dermatitis in X-ray treatment and at the same time to discuss the use of filters for the prevention of that dermatitis, and we are still without sufficient data as to the exact therapeutic differences between the radiations of an X-ray tube worked in the ordinary way and those of the same tube when the easily absorbed rays have been screened off. It is to be hoped that the near future may help to solve the problem for us.

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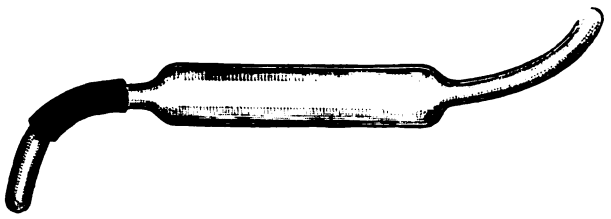
A NEW METHOD OF APPLYING X-RAYS TO LUPUS OF THE NOSE AND OTHER CAVITIES.

By J. HALL-EDWARDS, L.R.C.P.

The accompanying illustration shows a form of vacuum tube electrode which is useful for applying X-rays in small doses to the interior of the nose, mouth, ear, and other cavities, which I have recently adopted with good effect.

There is nothing novel in the idea, as a somewhat similar method is generally adopted, but the novelty consists in the employment of new electrodes and in the method of using them. Highly exhausted electrodes have been used in conjunction with a high frequency apparatus for utilising small quantities of X-rays in addition to the high frequency current. These electrodes were generally attached to one end of the



small solenoid, and the current passed directly through them to the patient.

Used in this way the electrodes are soon spoiled, either by the vacuum running up too high or by the passage of a spark through the glass. Again, the application of ordinary high vacuum electrodes to the cavity of the nose is apt to be painful, and the sparking from the tube to the free edge of the nostril is an inconvenience.

The electrodes which I use are made for me by Mr. Cossor, and are highly exhausted tubes without any metal terminals. The mode of application is as follows: The patient is placed upon the high frequency couch, which is connected to the solenoid in the ordinary way. The operator then takes the electrode in his hand and brings it into contact with the affected part, and thus sets up a flow of current between the patient and himself along the tube. In order to avoid sparking round the nostril the device of a short length of india-rubber tubing slipped over the glass, as shown in the drawing, is efficacious. Tubes used this way last a long time. I have recently treated two cases of lupus with great success by proceeding in this method.

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X-RAYS IN THE TREATMENT OF CARCINOMA AND SARCOMA.

By CHISHOLM WILLIAMS, F.R.C.S. (Edinburgh).

Last year I published a paper in the *Lancet** on "X-rays in the Treatment of Cancer," in which I gave a brief account of ten cases of undoubted carcinoma and sarcoma, which, had been brought to a successful issue by means of the X-rays. I did not say much about the actual technique employed, as I did not want to burden the mind of the practitioner who might read it with technical details, which possibly he might not have understood. A couple of weeks later, Mr. Marmaduke Sheild, in conjunction with Dr. Lewis Jones, published a case† of advanced mammary cancer, in a patient who had had four operations and which completely yielded to the X-ray treatment, the dosage he employed being almost exactly the same as I have been in the habit of giving

It is interesting to note, as illustrative of the attitude of some surgeons towards X-ray treatment, that a letter appeared about the same time in a medical journal from an eminent London surgeon, in which he said "he had never seen a case of cancer in which the X-rays had had any beneficial effect."

In a society such as this, it is important that the fullest details should be given as to treatment. Unfortunately our experience and knowledge are not sufficient as yet to allow of us all to practise with the same means, so that we cannot with much accuracy compare methods, though we may compare results.

Early Cases and Early Methods.—The earliest case of malignant disease that I had to treat by X-rays was sent to me in February, 1900. There was a deep epitheliomatous ulceration of the tongue in a man aged 61. All that I can say of the result in that case was that the pain seemed lessened. The patient died suddenly, apparently from hæmorrhage of the tongue. The treatment, such as it was, was kept up for four months, and during the whole time the patient steadily lost weight to the extent of about a pound a week.

From past experience of other early cases and from present knowledge I do not believe he had one-twentieth of the dose he should have had. At that period one was fearful of causing inflammation of the mouth, and the slightest reaction was considered to be the forerunner of that bugbear

* *Lancet*, November 4th, 1905.
† *Lancet*, November 18th, 1905.

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"Dermatitis." My first sixteen cases all succumbed within eight months of the commencement of treatment, and this was most discouraging, but still in some of them so marked an alleviation of pain was produced that I was encouraged to persist. The seventeenth case, that of a man aged 59 years, however, gave me much hope. In May, 1900, I removed by a V-shaped incision an epithelioma of the size of a large cherry from his lower lip. The Clinical Research Association reported that the part removed was "a squamous-celled carcinoma with surrounding tissues normal." In October, 1900, it had recurred in the outer edge of the scar as a hard dark purple nodule, of the size of a pea. The X-rays were applied through a lead screen, with an opening for the growth, for six sittings of five minutes each, at a distance of 3 inches. It speedily cleared up and there has been no return during the past five years and ten months. In August, 1900, I had what I consider another hopeful case. The patient was a man aged 38 years. In April, 1900, I removed a small tumour from the left parotid region; it had first been noticed in the preceding January. The incision healed by first intention. The Clinical Research Association reported on the growth that it was a "fibro-sarcoma with spindle cells." Four months later it had recurred in the shape of a lump of the size of a walnut, fairly hard, and adherent to the skin and underlying tissues.

The patient was treated by thirteen applications of about five minutes each with a fairly soft tube and through a lead shield, the shield being of a thickness of one pound to the square foot. The tumour rapidly disappeared. During the treatment a slight dermatitis was produced to the degree of dry exfoliation. It was unintentional, but the rapidity of the disappearance led me to think a great deal about the subject of the necessity or otherwise of a "reaction." There has been no recurrence during the past five and a half years.

Several other cases were gross failures. My usual method about this time consisted of using a hard old tube, at about 18 inches from the part and giving some ten minutes' exposure every day, the surrounding parts being carefully covered. I had always endeavoured to get repair without reaction, but the next case, in which the treatment was altered, produced such good results that in the majority of cases all shielding of surrounding parts, except in special situations, was discontinued for the future.

The patient was a single woman, aged 42 (sent by Dr. H. V. Griffiths). In June, 1899, the late Mr. Christopher Heath removed the left breast and glands in axilla for scirrhous carcinoma eleven months later. There was recurrence in the scar and in the axilla. A second operation was performed in March, 1900, and eight months afterwards

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an ulcerated lump formed in the axilla, discharging thin serous fluid tinged with blood. The Clinical Research Association reported on a minute portion, and stated that it consisted of scirrhous carcinoma cells. X-ray treatment was commenced in November, 1900, with daily exposures of ten minutes at each sitting, with a medium tube and with a distance of 4 inches between the glass and skin. There was no shielding of the surrounding parts. After sixteen applications a dermatitis was set up. It consisted of a deep erythematous blush over an area the size of the whole of the left chest and upper arm and around the scar there were a multitude of bullæ, for a few inches, each about the size of a millet seed. There was a cessation of treatment of five weeks, during which time the patient went to the seaside. On her return the area was pigmented and about the middle some dry exfoliation was seen; she was treated for a further six weeks by two applications a week of five minutes each with a fairly hard tube at a distance of 8 inches. In all, twenty-eight exposures were given. There has been no recurrence during the past four and a half years, and the patient is still in excellent health.

Theories.—Several theories have been advanced to account for the action of the X-rays on malignant growths. In my opinion they all seem to point to a leucocytosis being ultimately produced in or around the growth. Briefly, some of them are as follows:

According to G. Legros X-rays have a special selective action on new growth, the cell nuclei swell, do not stain well, the outline of the cells becomes indistinct and fuse, the protoplasm becomes irregular, is invaded by leucocytes and absorbed, leaving a network of dense connective tissue containing vessels with thickened walls, from endo- and periarteritis due to the rays.

Oudin and Darrier consider that the primary action is on the subcutaneous nerve cells, to the point of an irritative stimulation and inflammation.

Leduc considers the action of the X-rays as entirely due to ionisation, the electrolytic fluid, which bathes the living tissues, is partially ionised by the rays. The nutrition of the part being upset, the malignant growth acts the part of a foreign body to be resolved or thrown off by the assistance of the surrounding inflammation.

Bordier has shown that the X-rays have a marked effect on the phenomenon of osmosis. In his opinion the thin walls of the capillaries first undergo this alteration in osmotic properties, and the consequent interference with the molecular exchanges is followed by disturbance of nutrition and inflammation.

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Although the last three theories have been advanced to account more particularly for delayed reaction after a period of latency, they all might equally apply to the action of X-rays on malignant growth. No theory at the present time is entirely satisfactory, but it is encouraging to know that the action of the X-rays on the blood is gradually taking shape. Several of our members are obtaining excellent results in leucocythemia and allied conditions which may solve our difficulties regarding the theory of the action of X-rays not only in cancer but in other diseases.

Reaction.—Reaction in the part to be treated is a vexed question among some electrotherapeutists. For my part I am convinced from practical experience that some sort of reaction is absolutely necessary. It may not always be seen, and requires much watchfulness on the part of the operator. My worst failures have been those in which no visible reaction has been seen, either of the skin or, more important still, of the lump itself. The reaction may take the visible form of redness in the mass, if protruding through the skin, or round the edges, if an ulcer, swelling or hardness of the tumour, increased heat, perhaps in some cases increased pain, or other vague undefined sensations.

If a discharge be present it soon takes on a more healthy action both as regards appearance and odour, and frequently I have seen masses break down and slough away. Sometimes there is pent-up pus with elevation of temperature and night sweats. In one case of sarcoma of the side of the neck, the growth, after one application of a new soft tube for twenty minutes at a distance of 3 inches, became almost black, and the turgescence of the overlying blood vessels was very great, and after the sixth dose the mass was fluctuating, it burst and discharged pus with large pieces of greenish fœtid slough, which microscopically showed intense degeneration (wash-leather slough). In some growths the reaction may affect the patient in a general way, with symptoms such as slight increase of bodily heat at night, sweatings, headache, malaise, thirst, or loss of appetite. These symptoms generally yield to cessation of treatment for a time. They are mostly seen in large growths which are not ulcerated and have no exit for the products of disintegration, the patient having to absorb and get rid of them by the usual channels.

A state akin to septicæmia is often produced when there is extensive growth, and should be treated by the usual sustaining measures in addition to lessening the dosage. One most often observes the above symptoms in those extremely advanced cases in which the treatment consists of a race with the disease. At the present day he is a bold man who asserts the X-rays can do no good in cancer, for even in the very

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advanced cases pain may be relieved to an extraordinary extent. I am no advocate of the "sloughing-out" method, as the dangers of hæmorrhage are too great. Mild stimulation to facilitate absorption is the best goal to aim at.

Dermatitis: Preventative Measures.—Considering the prolonged treatment necessary to this class of case, it is not surprising if we sometimes meet with a dermatitis, and in my earlier cases I frequently produced a mild dermatitis unwittingly. We knew less about preventative measures in those days, but I am bound to say that some of my best results have had a dermatitis to the extent of dry exfoliation or even slight bullæ. A burn of the third degree is quite an exceptional accident in modern X-ray practice, but in the degree of erythema or even dry exfoliation, with or without pigmentation, I consider is of little importance.

The following case which I showed to you at the October meeting last year was the worst burn I have ever experienced:

The patient was a single woman, aged 39 years. She attended at the Westminster Hospital in September, 1902, where Mr. E. P. Paton removed the left breast for a scirrhous carcinoma and, according to her statement, "it never healed properly." In June, 1903, she consulted Mr. Bidwell at the West London Hospital, who diagnosed the affection as carcinoma recurring in the scar with infected axillary glands. There were four lumps in the scar, three of which were ulcerated at the centre: each was of the size of a penny slightly raised, and adherent to the underlying tissues. The lumps in the axilla were not very hard, but each was of the size of a walnut and there was also a supraclavicular gland of the same size. The treatment by the X-rays was commenced on June 15th, 1903, and consisted of ten minutes' application given twice a week at a distance of 3 inches from the skin, which was completely bared. After the ninth application a severe dermatitis was produced. The size of the area that ultimately peeled was $8\frac{1}{4}$ inches by 7 inches; it was practically the whole of the breast, the axilla, and the upper third of the inner side of the arm. This gradually subsided, when it was found that the lumps had all disappeared. On September 14th I resumed treatment on the lumps in the axilla, carefully screening the healed parts; they quickly vanished. The patient had in all sixteen applications during a period of four months. During the past two and a half years there has been no sign of a recurrence and she has been able to follow her occupation as a cook. The scar is very loose, and in the site of the ulcers the skin is peculiarly transparent owing to its extreme thinness; the underlying parts can be easily seen through them. At the present time there are no glands or lumps to be felt.

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Except in cases where the growth is strictly local, as for example in epithelioma of lip, I think it is best not to screen the surrounding parts, so that the rays may reach scattered deposits in the remoter tissues. From the knowledge recently gained in the treatment of ringworm by Sabouraud's method it is easy to keep tubes in such a condition that few irritative rays are given off, and although this may unduly prolong the treatment it seems at the present moment to be the best course to pursue. At first I tried a number of substances : aluminium foil earthed, various thicknesses of soft stuffs, clothing, vaseline, and other substances too numerous to mention. My almost complete immunity from burns to the patient I put down chiefly to the use of medium or hard tubes. Nowadays with the apparatus employed a dermatitis of any extent should be extremely rare.

Diagnosis: Microscopical and Macroscopical Evidence.— In the majority of cases the diagnosis rests with the surgeon or practitioner who sends the case for treatment. It is of the highest importance that microscopical evidence should be procured, and I think it should be an unwritten law that no case should be reported in the journals unless the diagnosis has been microscopically certified. It has been said after the disappearance of all signs of malignancy that the diagnosis must have been at fault, and this is poor consolation for those who have had to apply a tedious and anxious form of treatment for perhaps many months.

When macroscopical evidence has to be relied upon, as in the case of an internal tumour, or a primary cancer of breast which has refused operation or is inoperable, then the more numerous the medical men who examine the case the better for the X-ray practitioner. I have collected 238 cases of cancer reported in American and Continental journals, but of these I can only satisfy myself that a little over a quarter were carcinomas or sarcomas, and of these very few present microscopical evidence ; the American habit of calling rodent ulcer by the name of cancer accounting for a large percentage of so-called cures. It is common knowledge that rodent ulcer is particularly amenable to X-ray treatment.

One is almost led to believe that the X-ray treatment is itself somewhat diagnostic in character. Malignant deposits, primary, secondary, or glandular seem to harden under its influence, but to observe this phenomenon it is essential that the part be examined daily. Sometimes the hardening process takes weeks of treatment before the parts commence to soften or shrink.

Pre-operative and Post-operative Treatment. — If the theories mentioned are proved to be correct then it would seem to point to the advisability of using the X-rays in all

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cases prior to operation, more especially for the hard and usually slower growing varieties of cancer. The rays might be used with advantage sometimes, during the time in which the patient is being prepared for operation. The mildest dosage should be used, and the effects on the growth or glands carefully noted. It has been objected to by some that X-rays should not be used as a pre-operative measure on the following grounds:

1. The agent has not yet been proved curative; 2. The serious risk of extension of the disease to inaccessible glands or other regions by metastasis during the period of trial.

In answer to the first objection I am of opinion that the rays have been proved curative to a certain degree, though not as yet absolute it is true, and to the second objection I would advise their employment for a few weeks at the most prior to operation. In inoperable and recurrent cases the rays should always be used.

Post-operative treatment may be used directly the scar is healed or even before that time if it shows the slightest appearance of being sluggish in the healing, a nodule of the size of a pea should have immediate treatment whether in the scar or not; this requires for its proper fulfilment constant observation by the medical attendant.

In recurrent cases after operation the less "recurrence" there is to treat the easier it will be for the application of the rays to effect a favourable result. The best cases are those where the disease is strictly local.

Nevertheless the rays have given such promise of well-doing that in the present state of our knowledge it would be unwise to refuse treatment to any case on the score of extensiveness of growth. Again we must always remember that pain in any case may be relieved in a remarkable manner. Also the mere fact that something is being attempted for the patient has often proved to have an extraordinary effect for good on the mind of a patient and very materially assists them to bear their heavy burden.

Causes of Failure to Arrest the Progress of the Growth.—Failure may be attributed to several things. Amongst the most important will probably be: Inexperience on the part of the medical man; the vagaries of the apparatus; too mild or too energetic treatment; the case being hopeless on account of the growth being too diffuse, or having become disseminated throughout the internal organs of the body; or the patient's general vitality having been lowered by previous suffering.

Pain from the treatment is never severe, but when added to the pain of the growth the total may be considerable, though as a rule after a few applications the pain is materially

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relieved. I have had many cases where opiates have been entirely dispensed with shortly after commencing treatment. If, in a large mass, the central parts show a tendency to break down into pus without an efficient exit the pain may be considerable. Hot fomentations in suitable cases seem to effect much good. Violet leaves being still the fashion, they may be made into poultices or the hot infusion used as fomentations, whilst the patient may imbibe the decoction without ill effects. Another cause of failure is non-perseverance on the part of the patient, either from getting a measure of relief which he believes to be permanent, or from giving up the treatment owing to its tedious course.

Care must be taken that the part be transparent to the X-rays. Once I was consulted as to the failure of X-rays in a case of fungating sarcoma. It had had applications of X-rays twice a week for over nine months, and although the tumour had diminished for the first two months it had then rapidly renewed its growth. I found the lump about the size and shape of a cocoanut; of ivory whiteness, and consisting of an outer shell of hard, white, china-like material half an inch in thickness, which was found to be due to the large amount of dusting powder used, which had accumulated and was quite opaque to X-rays. The powder contained a very large percentage of zinc oxide. The same tube had been in use over nine months and was of such high resistance that it was surrounded by a veritable shower of sparks when operated, although the spark length of the coil was 12 inches, and the current streamed between the terminals during the whole application. A lay relative who applied the rays did not consider that all was right unless this phenomenon was observed. That was an example of too mild treatment.

The following is an instance of too energetic treatment: In one patient, of a very low vitality, who suffered from a large inoperable sarcoma involving the whole of the contents and walls of one orbital cavity, the treatment applied for the first six weeks quickly began to reduce the tumour, then in spite of my efforts it commenced to enlarge. A new tube was used and the time and applications doubled, but with this unfortunately the whole part sloughed out and uncontrollable hæmorrhage ensued, which in a few days proved fatal.

(*To be continued.*)

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TEN YEARS' EXPERIENCE IN THE LOCALISATION OF FOREIGN BODIES BY MEANS OF THE X-RAYS.

By J. HALL-EDWARDS, L.R.C.P., F.R.P.S.

(Continuation from page 52.)

The foreign body most commonly found impacted in the œsophagus is a coin. Curiously coins in the gullet are always found in the same place, and in the same position.

They invariably stick on a level with the top of the sternum opposite the cricoid cartilage, and are always placed with their flat surfaces forwards and backwards.

During the last ten years over sixty cases of coins in the œsophagus have been brought to my notice, and there are one or two important lessons to be learned from them.

In a number of the cases the coins had been in the gullet for a period varying from two or three weeks to three or four months without any serious consequences. The children were all able to swallow with difficulty and could take sufficient food to keep them in bodily health. They complained of occasional pains in the throat, and those of them who could speak exhibited a peculiar husky voice, which is nearly pathognomonic of the condition. The coins were all situated in the same position, and with the exception of one case, they were all removed by means of the coin-catcher or forceps.

In the exceptional case (which occurred in the early days) œsophagotomy was resorted to, and the child made a good recovery. The coin-catcher is one of the most useful instruments I know of, and if carefully used it is absolutely certain to achieve the results for which it is designed. It consists of a whalebone handle and stem into one end of which is fixed a short length of watch spring, carrying at its extremity a loose hinge or miniature anchor, which moves sufficiently far from either sides of the spring to grasp a coin should the edge of one fall between it and the spring.

When this is passed down the gullet, which contains the coin, sufficiently far to pass the obstruction, one of the free arms beneath, and behind or in front of the coin, so that in withdrawing the instrument the grasped coin is brought up with it. It is well to pass the index finger of the disengaged hand down the throat so as to steady the coin, or there is

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danger, especially if any force has to be used, of doing damage to the tissues.

Until the discovery of the X-rays the coin-catcher was generally held to be an almost useless instrument, and many surgeons preferred to run the risk of a serious operation rather than use it. The positive knowledge which has been gained by means of the fluorescent screen has, however, taught us to value the instrument at its full worth, and at the present time, having once satisfied myself that a coin is present, I have no hesitation in immediately passing the coin-catcher without an anæsthetic and bringing the foreign body up. I have already mentioned that in several of the cases quoted the coin had been in the œsophagus for a lengthy period with but slight apparent discomfort to the young patients, hence there has existed some doubt as to the presence of a foreign body at all; and it was only after the application of the X-rays that the diagnosis was made a matter of certainty. The difficulty of ascertaining the presence of a coin in the œsophagus without the X-rays leads me to ask: What became of such cases before their introduction? In all probability many patients died without the real cause being discovered. A coin left undisturbed would ultimately slough through into the trachea, and the patient would die from a septic pneumonia. There can be little doubt that many lives have been spared by the use of the X-rays in this direction. With their aid such a condition is not dangerous, and I have no hesitation in recommending the coin-catcher as a most useful and efficient instrument.

It occasionally happens, especially in very young children who have swallowed a small coin, that the introduction of the coin-catcher dislodges the foreign body and it passes into the stomach. No alarm should be felt at this, as it is nearly certain to be passed per rectum in a few days' time, especially if proper food be administered. It should be mentioned that in several cases in which a coin has been retained in the œsophagus, an œsophageal bougie has been passed without meeting any obstruction. This is due to the fact that the retained coin quickly becomes coated with a thick slimy mucus, which so covers the metal that to the soft pliable bougie it loses its characteristics. This should be borne in mind, otherwise (without the X-rays) one may be led to give a diagnosis contrary to facts.

Frequently coins are swallowed, and without meeting with any obstruction they pass through the alimentary canal without causing any serious symptoms. With the aid of the X-rays their progress can be watched, and all anxiety allayed as to their whereabouts. In one case I have known a penny retained for several weeks, the patient complaining of a little pain at times; it, however, suddenly moved from its position

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near the cæcum and was then passed per rectum within twenty-four hours. Coins are occasionally retained in the intestines, where they set up a considerable amount of irritation, and the surgeon-radiographer may be called upon to localise them.

Various other swallowed foreign bodies may be lodged in the œsophagus. They are easily localised, but their removal is a much more serious undertaking than is the case with coins. The coin-catcher will not hold them, and they must either be removed with the aid of forceps, or œsophagotomy must be resorted to. One of the most difficult foreign bodies to remove, which has come under my notice, was a round tin whistle; such are often inserted into sweetmeets for the purpose, it would appear, of inducing children to swallow them. The whistle was about the size of a halfpenny, but much thicker. It had rounded edges and a hole in the centre. It could not be held in a coin-catcher. The case was under the care of my colleague, Mr. George Heaton, at the General Hospital, Birmingham. The following notes are his, and are taken from an article by him on "Three Cases of Foreign Bodies in the Œsophagus" (*Brit. Med. Journ.*, June 4th, 1898):

"A little boy, aged five years, was admitted to the General Hospital on January 15th, with symptoms of œsophageal obstruction. The previous day, whilst sucking a small round whistle, he accidentally swallowed it, and it seemed to stick in his throat. He coughed up some blood soon after, and had pain at the episternal notch, and inability to swallow anything but fluids. On admission there was complete inability to swallow, and much pain at episternal notch. Nothing abnormal could be felt in the neck. A radiograph showed the whistle to be lying behind the first piece of the sternum, with its long flattened axis lying transversely. On January 16th an anæsthetic was administered, and several attempts were made to remove the body with forceps and coin-catcher. It could be felt distinctly in the œsophagus about 6 inches measured from the teeth, but no instrument could be passed beyond. Œsophagotomy was then performed. A 3-inch incision was made along the interior border of the left sternomastoid, the lower end of the incision reaching almost to the clavicle. The large vessels of the neck being drawn to the outer side, the œsophagus was easily exposed in the lower part of the wound. It was opened and the lips of the incision were held open by a suture passed through them on either side. On passing a probe down the œsophagus the whistle was felt firmly impacked behind the sternum. After several fruitless attempts it was finally extracted with forceps. The wound in the œsophagus was closed by a double row of catgut

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sutures; the inner row being passed through mucus membrane only. The outer wound was closed above, but its lower half was packed with iodoform gauze. The boy made a good recovery. No food was given by the mouth for the first forty-eight hours. There was a little leakage from the wound in the œsophagus for two or three days. This, however, quickly ceased, and he was discharged well on February 14th."

Pieces of bone or fish bones may lodge in the œsophagus or trachea. The former can frequently be localised by means of the X-rays, but the latter present great difficulties on account of their transparency. Of the numerous other bodies which lodge in this region, it is only necessary to say that those which are opaque can be localised with ease, and their removal can be materially assisted thereby.

The exact localisation of foreign bodies in the stomach, intestines, bladder, and rectum is of little service, at any rate as far as measurements are concerned, as the parts are so much disturbed during operation.

It is sufficient in most cases to indicate to the surgeon their approximate position, as on opening the abdominal cavity they can generally be felt, especially if of large size.

It is curious to note that certain foreign bodies which are accidentally swallowed, and which one would imagine could never pass through the alimentary canal without becoming impacted, pass through with comparative ease.

Case 7.—A boy of about twelve years of age was brought into hospital for having swallowed a stout needle an inch and a quarter in length, to the base of which was attached a kind of tassel of worsted an inch in length. He was engaged in playing at "puff and dart" when he accidentally drew the dart into his mouth and swallowed it. When I first saw him I localised the needle in the stomach. I watched its progress day by day, until it could be plainly seen in the rectum, and it was passed the following morning. In this case I should imagine that the worsted became saturated with mucus, and passed through the intestines pulling the needle after it, so that the latter had no chance of being impacted.

Case 8.—In a somewhat similar case the dart was drawn into the lungs and the needle was localised in the left bronchus close to the bifurcation.

Foreign Bodies in the Orifices of the Body.—The surgeon-radiographer is sometimes called upon to localise foreign bodies which have been inserted into the nose, ears, rectum, vagina, urethra, and bladder. Such a heterogeneous collection of unconsidered trifles are on occasion inserted into these orifices that it is impossible to give a list. When the bodies

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are opaque to the X-rays they offer no special difficulties. Most of these can, of course, be found without seeking the friendly aid of the X-rays, but on occasion it is best from several points of view to employ them. Hysterical women and young children are the most common patients, and as the foreign bodies in the former cases are generally inserted in the vagina or bladder, and as hysterical people are the greatest liars on earth, it needs no argument to prove that a carefully conducted X-ray examination may be of advantage alike to the surgeon and patient.

Case 10.—A child of five years of age was brought to the General Hospital, Birmingham, complaining of pain in the pelvis. Another child stated that the patient had pushed some foreign body into the vagina. A radiograph showed the presence of a hairpin in this region.

This was removed with some difficulty, and the child went home. The evil consequence of a vaginal examination in a young hysterical girl is sufficiently well recognised by the profession without my drawing attention to them.

In the X-rays we have at hand a method of examination which can be conducted without the patient's knowledge of what is taking place; and in this respect it has a distinct advantage over every other known method of procedure.

I have myself seen two calculi removed from the bladders of females by suprapublic lithotomy, the nuclei of which consisted of hairpins. As their presence was not suspected they had not been submitted to an X-ray examination.

I think it would be wise, however, to have such an examination made in every case in which a large stone is diagnosed in the bladder of a female. In these cases it is impossible to obtain a true history from the patient herself, and the knowledge of the presence of such a foreign body would be of great service to the surgeon.

Gun-shot Wounds in Civil Practice are much more common than is usually thought. In the radiographic report of the General Hospital, Birmingham, for the years 1901 and 1902 the following lists occurs:

	1901.	1902.
Bullets.—In hand ...	9	14
,, forearm ...	1	1
,, neck ...	1	2
,, knee ...	1	1
,, skull ...	1	6
,, wrist ...	1	2
Total ...	14	26

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	1901.		1902.
Shots.—In leg ...	1	In hand ...	1
,, elbow ...	1	,, face ...	2
Total ...	2		3

It will be here seen that no less than sixteen cases presented themselves in 1901, and twenty-nine in 1902.

With the exception of one case, which came from South Africa, they were all due to the indiscriminate use of the "toy pistol," and in the majority the users of the weapon accidentally wounded themselves, as will be seen by the large number of bullets which were located in the hands.

As a general rule, owing to the smallness of the weapons used, comparatively little harm is done, and the missiles are easily localised and removed. On occasion, however, a weapon of larger calibre is used, and the question of localisation and removal may be of great urgency.

It is necessary (at any rate in hospital practice) always to keep one's localising apparatus in good order, and to keep oneself in touch with the carrying out of accurate localisation; as one never knows when one may be called upon to locate a bullet under the most trying circumstances.

Bullets in civil practice rarely give anything like the amount of trouble given by those received from service arms.

As a rule the weapons used are either old and obsolete, or they are small, and incapable of inflicting a great amount of damage.

Of course, there are exceptions, and much also depends upon the part of the body struck.

I have seen several deaths follow the accidental or intentional use of the "toy pistol," and in several instances lives have only been saved after a severe operation, following an accurate localisaton by the X-rays.

Bullets from small pistols may enter the brain through the orbit. Here the most accurate localisation is required if the foreign body is to be found.

Bullets in the limbs can often be sufficiently well localised for all practical purposes by radiographing the limb from two points of view, whilst for those situated in the hands and feet the stereoscopic method of examination yields the best results. At the present time, when nearly every hospital worthy of the name has an X-ray outfit, the practice of probing for bullets should be entirely discarded.

The knowledge obtained from the use of the probe is inconsiderable; whilst the dangers consequent upon its use are great.

A leading surgeon recently informed me that the probe had never given him any real knowledge, and except for the

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purposes of applying dressings he had entirely discarded its use.

One of the highest tributes to the uselessness of the ordinary probe was paid on the introduction of Nelaton's special instrument, for the necessity of the latter was due to the inability of the former to detect a bullet even when touched. The telephone probe is an instrument of the same class, and only slightly the superior of the others. With all of them the foreign body must be discovered before it can be found.

A few weeks' practice should be sufficient to convince anyone that the probe is a useless, dangerous, and unreliable instrument. I will now quote a couple of cases in point.

Case 11.—A young woman was sent to me with a history of having been shot in the head with a small "toy revolver." The bullet entered just above the left eye, there was no exit wound. I was informed at the time of the accident (some three weeks previously) that a probe had been passed through the wound and into the skull for a distance of nearly 2 inches; and that on being withdrawn brain substance was discovered on the point of the instrument.

A radiographic examination proved that the bullet had not entered the skull at all, and it could be plainly seen flattened out and lying upon the frontal bone.

Where the probe was pushed in this instance must ever remain a mystery.

Case 12.—A boy of fourteen years of age was accidentally shot in the calf of the left leg with a "toy pistol."

When sent to me he had a scar about 7 inches in length down the side of the leg, and a drainage tube 5 inches in length was inserted through the wound caused by the bullet.

I was informed that a probe inserted directly after the accident passed in a downward direction for a distance of between 5 and 6 inches. An operation had been performed and the (supposed) track of the bullet had been followed without result. The incision made during the operation was nearly 7 inches in length. The drainage tube was placed in a false track made by the probe, whilst the true position of the bullet was unsuspected.

On showing the radiograph to the surgeon, I was informed that the bullet must have moved, as there could be no doubt as to the track followed by the probe being a correct one! The operation for extracting the bullet (with the aid of a radiograph) occupied about five minutes, a 2-inch incision being ample for the purpose. To prove that the bullet had not moved was the fact that by the side of it lay a small piece of cloth from the trousers which had been carried in with it.

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The probe in this case had made a special track for itself, and led to a serious operation and a lengthy stay in bed on the part of the patient, both of which would certainly have been avoided had the X-rays been applied in the first instance.

It would be an easy matter to quote any number of cases in which a serious operation could have been avoided by means of a carefully made localisation with the X-rays.

These two, however, should be sufficient to impress the practical surgeon, with the immense power placed at his disposal by modern methods.

Owing to the length of this paper, I have been obliged to pass over several important points, especially in relation to the localisation of foreign bodies in the eye. I trust, however, that this imperfect contribution may prove of use to some of you.

NOTICES OF BOOKS.

Copies of the works reviewed in these columns can be supplied by the Publishers of "Medical Electrology and Radiology."

CURRENTS OF HIGH POTENTIAL OF HIGH AND OTHER FREQUENCIES. By W. Benham Snow, M.D. Scientific Authors Publishing Co., New York. (Sole Agents: Siegle, Hill & Co., London.) 1905. 196 pages, with 8 plates and 40 illustrations. Price 12*s*. 6*d*. net.

This book deals with statical and high frequency methods of treatment, and describes in a clear and straightforward manner the effects which can be produced by their means. The instrumentation is fully gone into in the earlier chapters, and the different diseases which are amenable to these forms of treatment are then considered in detail. The rapid progress which is being made in electrical methods of treatment render a book of this kind very welcome, for the literature in book form of high frequency work is meagre, at least in the English language.

We are glad to see that the author does not write with excessive enthusiasm about high frequency methods, preferring to recognise that there are strict limitations for this form of treatment.

Dr. Snow is able to report that in sciatica his results have been higly satisfactory. The treatment of diseases of the rectum, of the uterus and its annexes, of the ear, nose, and throat, and of the skin, all receive full consideration. We think that our readers will find the book valuable.

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NOTES AND ABSTRACTS.

Röntgen Treatment and Röntgen Dermatitis, by Dr. Leopold Freund.—As the oldest practitioner of radiotherapy, with an experience extending over more than nine years, Dr. Freund's views on any question of electrotherapeutics must be received with respect. There are two points in his paper which deserves especial notice.

He reports a case of hypertrichosis of the chin, treated in 1901. The woman was irradiated, a successful epilation was produced, and this was repeated several times. The patient observed that the length of time which elapsed before the re-growth of the hair was proportional to the intensity of the reaction. She urged that an intense reaction should be set up at all costs, so that the epilation should be speedy and durable, with the result that a permanent epilation was produced. This, however, was accompanied by serious ulcers, which took a long time to heal.

This observation is of importance in the treatment of ringworm by epilation. One or two observers have noticed a considerable delay in the re-growth of the hair in consequence of over-exposure. Dr. Freund lays great stress on the variations of the susceptibility of the skin due to changes in the circulation and innervation. Occasionally a dose, which under ordinary conditions would be barely sufficient to produce the necessary degree of reaction will, under peculiar conditions, prove too large and cause excessive reaction. These rare cases are often due to some peculiar physical condition of the patient. One cause of such excessive susceptibility is of the greatest importance. Freund reports the case of a girl who was treated by him for hypertrichosis in the usual manner. At intervals of five weeks, six carefully measured doses of X-rays were given in six consecutive sittings. In each case he obtained a slight intumescence and pigmentation a few days after the treatment, and two days later the hairs fell out. On one occasion he noticed that on the third day of treatment, *i.e.*, when she had only had two irradiations, not enough to have had any effect according to previous experience, there was a slight bare patch on the chin. He at once stopped the treatment and told the patient to return next day. He then found that the typical symptoms of a pronounced Röntgen reaction had already appeared, viz., inflammation of the skin, erythematous discolouration, and smarting pain. Three days later the hair fell out. The signs of reaction gradually disappeared and the skin remained bare for five weeks. He had thus obtained with two irradiations precisely the same effect as he was in the habit of getting after six irradiations of the same intensity.

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The cause of this unusual reaction long remained a mystery. At last the riddle was solved by the discovery that the irradiation had been given immediately before the patient's menstrual period, at which time her integument was much more sensitive to irritative influences. This was confirmed by a subsequent repetition of the occurrence in the same patient.—*Archives of the Röntgen Ray*, April, 1906.

* * *

A New Form of High Tension Current, by Prof. Rumpf, of Bonn.—It is well known that the d'Arsonval or Tesla currents are but little used in Germany. Dr. Rumpf demonstrated to the post-graduate class at Bonn a new form of high tension current, which he claims to have a tension similar to that of a static electrical machine, but with greater quantity.

He uses a small coil giving only a 2 or 3-inch spark, driven by an accumulator furnishing 2 ampères at 12 volts. As electrode he employs a glass flask with large base, such as is used in chemical laboratories for distilled water. The whole of the flask, with the exception of the neck, is filled with tinfoil loosely crumpled together in a ball, and one of the rheophores from the coil, well insulated by a rubber sheath, is led through a perforation in the cork and terminates in a coil so as to make good metallic contact with the tinfoil. The thin glass of the bottle breaks up the alternating current from the coil into a vast number of rapid oscillations. When the current is weak only a pleasant prickling sensation is felt, and there is no muscular contraction even when the electrode is placed on the biceps or pectoralis. With a stronger current there is a certain amount of fibrillary reaction, but this should in general be avoided. The neck of the bottle contains no tinfoil, and therefore forms a convenient insulating handle. This electrode may be used either as anode or cathode.

The second terminal of the coil is connected through a galvanometer and a liquid resistance to an earthed metal plate. The current used should be from 5 to 10 milliampères. This may be further regulated by interposing a board or other resistance between the metal plate and the feet of the patient.

These currents may be used either for local treatment or for general electrisation. Dr. Rumpf demonstrated an increase of some 20 mm. of mercury in the blood pressure after five minutes' application of the electrode to the cardiac region. He has found the treatment useful in many cases of heart disease. It has also been used with advantage in neuralgic cases. On account of its inexpensiveness and facility of application this treatment will be found of great use in situations where a large electrical installation is not at our disposal.—*Zeitschrift für Electrotherapie*, February, 1906.

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Cancer developing in an X-ray Scar.—In the March number of the *British Journal of Dermatology*, Dr. J. M. H. McLeod describes a case in which epithelioma developed after a prolonged course of X-ray treatment. The case was one of a woman, aged 34, who had suffered from lupus since childhood. When first seen by Dr. McLeod she had already undergone a course of treatment with X-rays, and presented a large scar on the right lower half of the face extending on to the neck. It was smooth and pale in the centre, but there was a network of dilated capillaries round the margin, and beyond this there was a zone of pigmentation. The central part was free from lupus. Two years later a small reddish-brown patch developed in the centre of the scar at the point where the collar of the dress rubbed against the neck. It was of about the size of a sixpenny piece, raised, hard, and covered by scaly epidermis. A few applications of X-rays were made and the patient disappeared for several months, but returned six months later with a more marked thickening of the epidermis on the suspicious patch. Several X-ray exposures were again given, but they produced no marked benefit and were consequently discontinued. The patch steadily enlarged and an ulcer formed in the centre and had increased to the size of a shilling two months later. Excision was then performed and a microscopic examination of the growth showed the presence of squamous-celled epithelioma with cell nests.

Dr. McLeod expresses the opinion that a reaction followed by the production of a nævoid scar should be avoided in the X-ray treatment of lupus. The development of carcinoma in regions which have been the site of lupus seems to be more common since the introduction of the X-ray treatment.

* * *

The Glow-Light Oscillograph.—In *The Electrician* for April 6th, there is a letter from Dr. E. Gehrcke, of Charlottenburg, in which he refers to an account of the oscilloscope in a previous number of that journal, in which its invention was ascribed to Ruhmer, and states that this apparatus was invented by himself. He writes, "I beg to remark that it was not Mr. Ruhmer who invented this oscilloscope. In 1904, on the 29th April, I demonstrated the first apparatus of this kind before the German Physical Society," and he adds that he not only invented the original form of the tube, but that the original form of the instrument is now superseded by a new form, also invented by himself, in which the electrodes consist of plates instead of wires. This form is so sensitive as to allow of the photography of currents alternating as rapidly as 4,000 times per second, and is described in

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the *Zeitschrift für Instrumentenkunde* for 1905, vol. xxv., p. 278. We are glad to insert this correction, as the account published by Ruhmer in the *Elektrotechnische Zeitschrift* appeared to convey the impression that the apparatus was designed by Ruhmer himself.

* * *

X-rays in Leukæmia.—Ledingham gives an account of the hæmatological and chemical observations made by him in a case of splenomedullary leukæmia. An account of the treatment of this case appeared in the *Lancet* of January 14th, 1905. The changes produced in the ratio of red and white corpuscles were exceedingly marked; in fact, the white corpuscles on one occasion were reduced to 7,000. The author, remarking on the experiments of Halbe and Linser (in which it will be remembered they succeeded in completely removing the leucocytes from the blood of small healthy animals by means of X-rays) was afraid that a similar result might be produced in his patient. It should, however, be borne in mind, that only in very small animals, which were completely exposed to the rays, could this result be obtained; it failed altogether in the larger animals, such as the dog and rabbit, and therefore the writer need have had little fear of such an undesirable effect on a human being. Another important fact is that in Halbe's and Linser's experiments the hæmopoietic organs were found partially or completely converted into fibrous tissue, which seems only to occur under direct exposure. Hence, if the X-rays are only employed locally, the possibility of producing a complete leucopenia is very remote.

Ledingham remarks on the late response of the red corpuscles in his patient, finding that the appreciable rise in numbers came to a maximum when the white cells were beginning to mount again some time after the suspension of the X-rays. Do we admit that the number of red corpuscles is increased by X-ray treatment? It seems more likely that the removal of an enormous excess of leucocytes from the blood permits the red elements to regain their normal numbers.

This patient died from an intercurrent influenzal attack, during which the white cells mounted from 12,000 to 43,000, a remarkable fact, as the author points out, since it is a well-established fact that intercurrent affections in leukæmia produce a great fall in the number of leucocytes, the reaction here being in the opposite direction.

Examination of the urine showed that the phosphoric acid output became relatively high, but its proportion to the total nitrogen remained unchanged, thus seeming to indicate that the fall of leucocytes was not the result of increased destruction but of diminished production.

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The post-mortem changes in this patient showed the lungs to be congested, with patches of catarrhal pneumonia lymphatic glands enlarged, bone marrow in a hypoplastic condition. In the spleen malpighian follicles were practically absent, and there was a marked development of coarse connective tissue. Neutrophile cells were very scarce.

Whether the fall in leucocytes is due to destruction or inhibition of production—and it seems likely to be due to both causes—the fatal intercurrence in this case warns one again of the danger of producing such sudden and marked changes in the blood, and every case of which one gets an account seems to the present writer to indicate more cautious dosage and more careful localisation of the exposures to X-rays.—*Lancet*, February 10th, 1906.

* * *

Conviction under the Medical Act.—On March 14th, at the Marylebone Police Court, Emil Otto Muschik was prosecuted by Mr. S. H. Lushington, on behalf of the Medical Defence Union, under Section 40 of the Medical Act of 1858, for wilfully and falsely taking and using the title of Doctor of Medicine.

The defendant had a brass plate on his door at 12, Marble Arch, on which he was described as "Dr. Muschik." On February 9th, Mr. T. W. Tyrrell, acting under the instructions of the solicitor of the Medical Defence Union, called on the defendant. Mr. Tyrrell was in good health, but the defendant, after feeling his pulse and taking his temperature, pronounced him to be suffering from fever; no qualified medical man after taking Mr. Tyrrell's temperature could have supposed this to be so. Three days later he called again, when the defendant stated the fever had not quite subsided; a further visit was paid a fortnight later. On each occasion the defendant gave him a certificate signed "Dr. Muschik" to enable him to obtain leave of absence from business. On the first visit he gave him a pamphlet relating to "Dr. Muschik's Vibration" and a prescription, and asked him for a fee of 5 guineas; when this was refused he reduced it to 3 guineas, and 10 shillings was paid on account. On the other occasions Muschik gave him packets of herbs and further certificates recommending absence from business. The defendant also had branches in Pimlico and Harrogate.

Mr. De Fleury, on behalf of the defendant, pleaded guilty; he said his client was a German, and was the holder of certain foreign diplomas, but was unaware of the necessity of registration in England.

There was a summons in respect of each certificate, and the magistrate, Mr. Paul Taylor, inflicted the maximum fine

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of £20 in respect of each, and £10 10*s.* costs.—*Brit. Med. Journal*, March 24th, 1906.

* * *

A Warning to Telephone Subscribers.—An anonymous correspondent has recently written to the medical journals with reference to the introduction of a new form of telephone, and to warn medical men against it, on the ground that it has the great drawback that if an extension instrument is used the conversation from either end can be heard at the same time with equal distinctness both at the main receiver and on the extension. Many medical men have an extension telephone in their consulting room for the sake of extra privacy, and would object to an apparatus which allowed that privacy to be intruded upon without the speaker's knowledge by anyone who chose to listen at the receiver of the main instrument when the extension was being used. The writer adds that having accepted the new form of instrument he is unable to secure the restoration of the original one, and he complains that he was not informed by the canvasser that with the new instrument there would not be the same privacy of conversation as there was with the old one. He therefore writes to warn his professional brethren against accepting a change of telephone so long as the new instrument offered them presents such a serious defect.

* * *

Radium Treatment of Trachoma.—Jacoby experimented with radium in three cases of follicular conjunctivitis and eight of trachoma. One eye in each case was treated in the ordinary way and the other subjected to the action of the radium. His results were disappointing: although in every case the radium gave beneficial results these were distinctly inferior to the results obtained in the opposite eye, which underwent the usual treatment by drugs and mechanical means. He concludes that the use of radium leads to loss of time and thinks the benefit that is obtained to be probably due to outside factors—such as the hyperæmia caused by prolonged exposure to air of the diseased conjunctivæ—and not to the action of the radium itself.—*Münch. med. Woch.*, January 11th, 1906.

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Thirty-fifth Ordinary Meeting of this Society was held at 11, Chandos Street, W., on Friday, March 23rd, 1906, at 8.30 p.m. The President, Mr. J. HALL-EDWARDS, in the Chair.

Present: Nineteen members and one visitor.

The minutes of the Thirty-fourth Ordinary Meeting were read and confirmed, and two new ordinary members—Drs. T. Lowe Bunting and Alex. Howard Pirie—were unanimously elected.

Mr. CHISHOLM WILLIAMS, F.R.C.S. Edin., read a paper on "X-rays in the Treatment of Carcinoma and Sarcoma," which appears in this issue. He said that he had drawn materials from his own personal experience and had not attempted to give a general digest of the whole subject.

After the reading of the paper the PRESIDENT said that all would agree with him that they were deeply indebted to Mr. Chisholm Williams for his valuable paper. The subject was one which might give rise to a considerable amount of discussion, and he hoped the Society would consider it fully.

Dr. LEWIS JONES congratulated Mr. Williams upon the results he had been able to report. He was sorry to say that he had not yet been fortunate enough to have had a single case of carcinoma in which a completely satisfactory result had been obtained. He wished to refer, first of all, to a case of Mr. Sheild's which he had treated by X-rays last year, as an account of the case which was published in the *Lancet* gave the impression of having been successful. Unfortunately the patient had subsequently developed some enlarged glands above the clavicle, and soon afterwards a pleural effusion formed on that side of the chest. The patient returned home to the West Indies, and he had since heard that she bore the journey very well, but the effusion into the pleura had not cleared up. He was glad to have had the opportunity of giving these later details of the case.

He would like to hear the views of members on the question of the occurrence of bad effects as a result of X-ray applications in certain forms of malignant growths. He had noticed that in cases of malignant tumours in the neck, secondary to squamous-celled epithelioma of the lip or tongue,

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such tumours might become inflamed, break down, and discharge necrotic material very soon after X-ray applications had been begun. This form of reaction to the X-rays was unfortunately associated with a rapid development of fresh growth all around the necrotic area. He had lately observed French writers hint at having noticed a similar effect.

He was inclined to agree with the view that a little reaction was useful. In the case of radium treatment the good effect seemed to begin with a reaction. Radium rays and X-rays being so closely allied, one might fairly argue that what holds in one case holds also in the other. In a case of recurrent carcinoma recently seen, a number of small, red, active-looking nodules had formed in front of the chest, not far from the axilla. No improvement showed itself in these spots until a reaction was obtained, but after that an improvement set in and continued for a month without further X-ray treatment.

In considering the mode of action of X-rays upon malignant disease, a difficulty occurred in explaining cases in which a new cancer developed while the case was under X-ray treatment. In a case of that kind, which had been examined at St. Bartholomew's Hospital, the microscopical appearances in the new growth which had developed under the X-ray treatment were reported to be typical of normal, rapidly-growing carcinoma.

With regard to sarcoma, he was glad to be able to report that the case which he showed at Leicester in July last was still under observation, and in that instance the X-ray treatment seemed to have been effectual, for as yet no sign of relapse had shown itself.

Dr. G. B. BATTEN reported on a case in which successive crops of nodules had been caused to disappear by X-rays, though without permanent benefit to the patient. He considered a reaction was desirable.

He wished to ask Mr. Williams whether he had had any experience of deep-seated cancer, and whether the X-ray treatment did harm or good in those cases. He would also ask whether disintegration products tended to cause spread of the cancer or not. He thought this was a practical point.

In post-operative treatment, say after excision of the tongue, if it were thought advisable to make preventive applications (that is to say, applications to prevent recurrence), at what point ought one to apply the rays—to the operation scar or to the region of the glands in the neck?

Was it probable that a few long exposures might be employed instead of many short ones?

Finally, what tube did Mr. Williams prefer?

Dr. DAVID ARTHUR considered that the question as to a tube's hardness or softness was a very important one in the

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causation of X-ray dermatitis. He had lately used a hired apparatus consisting of an 8-inch coil and a very soft tube supplied, he thought to suit the coil. He had a case of epithelioma of the leg to treat in a lady of 70 years of age. The epithelioma occupied the scar of a very extensive scald, produced in infancy. An injury to the scar had caused it to ulcerate several years ago and it had never healed properly. Eventually a large carcinoma developed there. At the first visit he gave ten minutes' exposure with a distance of about 6 inches between anticathode and the surface, and two days later repeated this. On going the next time he found that there was marked dermatitis and therefore stopped treatment. The tube was a very soft one, with barely an inch of spark gap, an accumulator (12 volts) was used to work the coil. The anticathode was at a bright red heat. Thus two applications of ten minutes each from a weak coil had produced a severe dermatitis, which was developing into a regular X-ray burn as the whole edge is now threatening to slough. He therefore strongly advised members to test the hardness of their tubes, for he considered that with a low tube, as for instance one with a sparking-gap distance of an inch, one was almost certain to get dermatitis very early.

Dr. W. F. SOMERVILLE suggested a hypothetical case of, say, a lady of 45 years of age, with carcinoma of the breast, with the glands in the axilla involved, but with nothing felt in the supraclavicular region. Would Mr. Williams advise a surgical operation or not? If an operation had to be done, surely the sooner done the better; but Mr. Williams spoke of making use of the X-rays in the interval previous to the operation. Of course, in cases which were inoperable the situation was a different one. But whenever operation were possible he would adhere to the method of treatment by the surgeon's knife.

Dr. FOWLER thought that it might be useful in cases of more deep-seated cancer to use two tubes, each with a tube screen, so as to produce rays which would intersect below the surface at the situation of the tumour. If the plan could be carried out the tumour would then get double the radiation without any increased danger to the skin.

Dr. DAVID FINDLAY asked for more opinions with regard to special reaction. He had seen a patient who was suffering from sarcoma of the neck. The sarcoma was evidently extending up over the side of his head behind the ear. There was intense pain, the patient could not sleep at night, and could not eat. He was treated with a hard tube, and after a second application of twenty minutes a pretty smart reaction developed, and treatment by X-rays had to be stopped. Subsequently the superficial jugular glands, which had previously shown no signs of becoming enlarged, had become enlarged.

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He thought that valuable time had been lost by the reaction, and that if he had been able to go on steadily with the exposures the result might have been better.

Dr. REGINALD MORTON said that at the London Hospital the X-ray work was now done without any lay assistants. He thought that increased experience increased the difficulty of forming a decision upon such points as those submitted to-night. Formerly, when his experience was limited to one or two cases, he had formed conclusions very easily and rapidly. But now he felt more confused than before. On one point, however, he felt very sure, namely, that a certain amount of reaction was necessary for good results. In cases where reaction had been carefully avoided the condition of the patients seemed to be at a standstill. All the cases in which he had seen anything approaching to a good result were accompanied with more or less reaction.

He thought that in superficial cases a wide area should be exposed to treatment. In treating a cancerous breast he would leave uncovered a square foot or more of surface inches. Severe reaction was only caused by unnecessarily energetic treatment. In a case of recurrence under his care the place from which the breast had been removed was swollen up to the size and almost to the shape of the original breast. The line of the scar bulged upwards and was discoloured, so that the tumour seemed as if it would burst. The treatment produced violent dermatitis, but that breast was now perfectly sound, and had been so for eighteen months, and although the disease had recurred in the other breast. No glands had developed on the side of the original operation. He thought that for the treatment of malignant disease the rays which produce a dermatitis are not rays most needed, for those rays are absorbed in the skin, and if troublesome dermatitis is set up the treatment has to be stopped in consequence.

To cut off these rays, he had tried the plan of saturating some lint in a solution of tungstate of soda, allowing it to dry, and using two to four thicknesses as a protecting layer or filter. Since using that to protect the skin he had been able to give X-ray applications more frequently than before, and his cases as a whole were doing better. Another substance which had been recommended as an X-ray filter was leather; it being assumed that if the skin would arrest certain rays that leather should do the same. He considered that the plan of X-ray filtration to get rid of the superficial burning rays had been a decided gain.

His views with regard to the hardness or otherwise of tubes was that soft tubes should be avoided. The alternative spark gap should stand at from 4 to 6 inches, certainly never under 4 inches. He thought that a current of 2 milliam-

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pères through the tube was excessive, and that it was almost impossible to get 2 milliampères of effective current through an X-ray tube. His own practice gave a range between 0·5 and 1·0 milliampère. I use a Millson's tube—about a 5-inch bulb.

He quite agreed that it was important to distinguish clearly between epithelioma and rodent ulcer in statistics of X-ray therapeutics. Last summer he met Dr. Lester Leonard, of Philadelphia, the President of the American Röntgen Society, and told him that we thought some cases which were called epithelioma in America would be called rodent ulcer in this country. Dr. Leonard replied that, in his opinion, there were more cases of genuine epithelioma of the skin in America than there were in this country, and that, at all events, the difference between rodent ulcer and epithelioma was quite clear to his mind.

To combat the view that X-rays cannot do good at all in cases of cancer he would mention only one case: A lady, the sister of a doctor, was operated upon for cancer, and about six months afterwards she showed an array of nodules along the scar. She was treated by the X-rays, and reported herself at Christmas of 1904, at Christmas of 1905, and again three days ago, when she was perfectly well. She had undergone the one operation, and no treatment at all had been given for fifteen months.

He was glad to hear a report of Dr. Franklin's radiometer, for it was at his suggestion that Messrs. Newton & Co. took it up. He thought it brought operators much nearer than anything else to what was required, namely, an approach to a direct reading of the effective rays. He would like to know whether Mr. Williams had noticed any difference between new and old tubes as regards activity. Old tubes, in his opinion, were not nearly so radio-active as new ones, although the conditions might be the same as to spark gap, etc.

Dr. Batten said that in a conversation with Professor Soddy, on the measurement of X-rays, that gentleman had suggested the use of some modification of the bolometer to absorb and indicate the whole of the radiation from the X-ray tube.

The President cordially joined with those who had already spoken in expressing his thanks to Mr. Chisholm Williams. He had been treating cases of cancer by the X-ray method ever since it was started, and had not had a single case which had completely yielded to X-ray treatment, still in many cases the X-rays had done good. He was astonished that any surgeon should say that he had never seen any case in which good had resulted from the X-rays. The X-rays were a better remedy for cancer than any other therapeutic agent that the profession could command. As the

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knowledge of cancer and of X-rays increased better results might still be obtained. He had seen bad results in some cases, and in cases of the class mentioned by Dr. Lewis Jones he had discontinued X-ray treatment.

Considering what a painful disease cancer was, he thought one would be justified in trying anything which was at all likely to bring relief. He had been asked if violet leaves might be used, and his reply was by all means use violet leaves if you think they can do any good. In his own experience, however, the results obtained from violet leaves were most disastrous. Applied externally they lead to cutaneous eruptions, and applied internally to diarrhœa. He had been trying trypsin in conjunction with the X-rays, and thought the results seemed favourable.

An important point, especially in the case of recurrent carcinomas of the breast, was the area submitted to treatment. He was uncertain in his own mind as to how large an area should be taken in. Cases in which a wide area was exposed certainly did better than others in which the action of the rays was limited to the foci of recurrence. His attention had recently been directed to a case he had seen formerly. A surgeon, near Birmingham, asked him to give a second course of treatment by the X-rays to a lady. When he first saw her he considered her case desperate. There was extensive recurrence over the whole of the pectoral region right into the axilla ; with 150 nodules varying in size from a millet seed to a walnut. Treatment was pushed until a fair amount of dermatitis was set up. The patient also had a secondary growth of the liver, which was so enlarged that she seemed as though pregnant, and she had much ascites. Within a few months the liver went down very considerably, and she has been more comfortable than for years past. Only in the last fortnight has a recurrence in the breast taken place, for which I have been asked to see her again.

As for deep-seated cancer he had formerly related one or two cases in which the treatment seemed to have done some small good, but in the great majority of cases, beyond relieving the pain, the treatment was of slight use. In the production of dermatitis much depended upon the idiosyncrasy of the patient. One man whom he had photographed for stone in the kidney came to him again three weeks ago with a round mark on the skin of the abdomen. On examining further he found that the mark coincided with the bottom of the compressor used for the X-ray photograph. There was a well-marked erythema and intense pigmentation. Thus in some cases there might be smart reaction after a very short exposure.

Mr. CHISHOLM WILLIAMS, in his reply, said that he had seen disappearance of supraclavicular glands under X-rays

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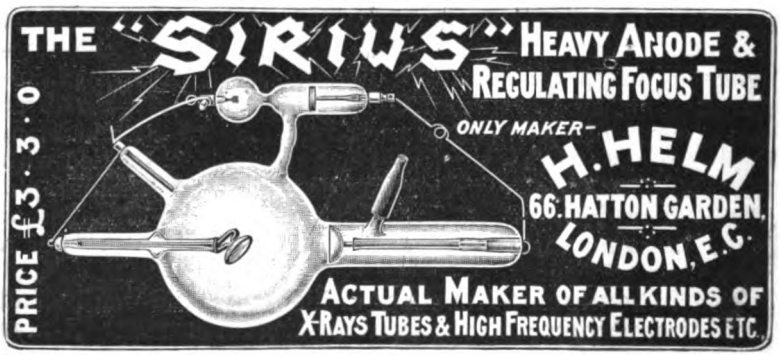
in two cases. One of the patients was now quite well and the other was very much better. On the question of one long exposure rather than many short exposures, the whole trend of X-ray treatment was towards fewer applications with longer intervals. He thought that one, two, or three days between successive applications was desirable, and that in the future applications would be made with longer intervals between.

He used a regulating tube of one form or other, generally one with the osmo regulator or one of the "self-regulating" tubes. The anticathode seldom became red-hot. He would certainly advise operation where this was reasonable.

He had used the filter of sodium tungstate cloth mentioned by Dr. Morton, and had given long exposures with it in extreme cases without producing any visible reaction.

He had not had Dr. Franklin's electroscope long enough to speak of it with confidence, but, so far as he had used it, it certainly seemed to act well. With regard to deep-seated cancer, one could not expect much relief from the use of the X-rays.

The meeting then concluded.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MEDICAL

Electrology and Radiology.

No. 5. MAY, 1906. VOL. VII.

THE PROVINCIAL MEETING AT BRISTOL.

The Provincial Meeting will be held in Bristol at the Clifton Downs Hotel on the 27th of July. It is important that members should attend this meeting, in order to ensure its success, for a good gathering will go far to show the profession in the West of England that our Society is an energetic one, and has members who are prepared to take some trouble to make the meeting a good one.

The programme of papers will be printed in our next issue, and we take this opportunity of reminding members that if they have communications to make or cases to report they should at once notify the Provincial Secretary, Dr. Kenneth Wills, who will be glad to receive additions to his programme.

Members who have not yet visited Bristol will find the occasion a good one for seeing the city, and for enjoying the magnificent scenery of the Clifton Downs, the river Avon, and the hot springs which rise close to the Clifton Downs Hotel. As the meeting will be held on Friday, an opportunity and an excuse for a pleasant week-end holiday is afforded to members by the choice of Bristol as the place of meeting.

In the Medico-Chirurgical Transactions for 1905 there is a paper by Dr. William Thorburn, of Manchester, on the relationship between cervical ribs and atrophy of the intrinsic muscles of the hand. It appears that the special form of muscular atrophy first described by Dr. Lewis Jones, in the St. Bartholomew's Hospital Reports for 1893, is frequently associated with the presence of cervical ribs, and we understand that a paper on the subject is to be read by him at the Bristol Meeting.

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Books and Journals Received.

MECHANICAL VIBRATION AND ITS THERAPEUTIC APPLICATION. L. H. Arnold Snow, M.D.
TRANSACTIONS OF THE AMERICAN ELECTROTHERAPEUTIC ASSOCIATION. 1904.
ANNALES DE MÉDECINE ET CHIRURGIE INFANTILES.
REVUE DE CINÉSIE.
LE NÉVRAXE. Vol 7. Fascic. 3.
LE RADIUM.
RIVISTA INTERNAZIONALE DI TERAPIA FISICA.
ARCH. D'ELECT. MÉDICALE.
JOURNAL DE PHYSIOTHÉRAPIE.
THE JOURNAL OF MENTAL PATHOLOGY.
THE JOURNAL OF ABNORMAL PSYCHOLOGY.
THE BULLETIN OF THE UNIVERSITY OF NEBRASKA COLLEGE OF MEDICINE.
MEDICAL REVIEW OF REVIEWS.
ARCHIVES OF PHYSIOLOGICAL THERAPY.
THE MEDICAL COUNCIL.
JOURNAL OF ADVANCED THERAPEUTICS.
BROOKLYN MEDICAL JOURNAL.
NEW YORK MEDICAL JOURNAL.
MEDICAL RECORD.

Hydro-electric Baths in Various Cardio-vascular Affections.—M. Albert Weil and M. Mougeot have been studying the action of a hydro-electric bath of triphase alternating currents in a certain number of cases of heart disease. In three patients the investigation was very complete, and included observations on the frequency of the pulse, the arterial and arterio-capillary tension, tracings both of the radial pulse and the capillary pulse, and of the area occupied by the shadow of the heart as observed by ortho-diagraphy before and after the administration of the bath. On March 28th M. Weil and M. Mougeot communicated an account of their researches to the Therapeutical Society, and the chief points were as follows. There was a notable fall in the arterio-capillary pressure. Three times out of four there was a notable fall in the arterial pressure which, however, remained constant in the fourth experiment. The radial pulse-tracing shows definite modifications, namely, a rise in the amplitude of the systolic wave, an accentuation or appearance of the elastic arterial wave, and an accentuation of the dicrotic wave. There is no increase in the amplitude of the capillary pulse. The cardiac area as measured by ortho-diagraphy undergoes a remarkable diminution when the heart is dilated. The observers concluded that the triphase current bath brings about a diminution of the arterial resistance and favours the emptying of the heart, and that by its administration it can be made a valuable treatment for hypertension.—*Lancet.*

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THE INFLUENCE OF HIGH FREQUENCY CURRENTS ON THE SURFACE TEMPERATURE OF THE HUMAN BODY.

By W. F. SOMERVILLE, M.A., B.Sc., M.D., Glasgow.

The influence of High Frequency Currents on the surface temperature of the human body is a subject to which I have directed particular attention during the last few months. It is often remarked by patients who are undergoing high frequency treatment that at the conclusion of the sitting they "feel warmer." With a view to deciding whether this sensation of warmth was imaginary or real, and if real, for the purpose of determining the exact amount of rise of surface temperature, I have conducted a series of experiments. I may state in passing that it was a matter for surprise to me to find how, apart from the influence of high frequency currents or other form of treatment, surface temperatures taken at different parts of the body varied, not only according to the locality but also according to the individual, and when the same individual and locality were chosen, the temperature varied on different days. Further, I noticed that where the surface temperature was taken at corresponding points in the two limbs there was almost invariably a lack of uniformity.

Great difficulty was experienced in obtaining thermometers that could be relied upon; finally Zeal, of London, made me two special thermometers, free from all metallic framework, and with a comparatively large coil of mercury. These were attached to the surface of the body by means of bandages or elastic straps, care being taken to prevent, so far as possible, local congestion. The thermometers permitted the mercury not only to rise but to fall. They were tested daily with warm water and were always found to agree. Previous to the current being turned on, the thermometers were allowed to rest for several minutes on the part to be tested, until the mercury rose to the maximum, and I was sure that the accurate temperature of the surface was recorded. The current was applied in each case for fifteen minutes, during which time the temperature was noted at intervals of three minutes. At the conclusion of the fifteen-minute sitting the current was turned off, and the temperature again noted at intervals of three minutes, for fifteen minutes more. Many patients were experimented upon; different localities were chosen; and varying amounts of milliampèrage were employed. The specially constructed charts, which I will show you, speak for themselves, and demonstrate very clearly the variations in the rise of temperature, according to the milliampèrage and to the site selected for experiment. The patient, in each case, lay on the condenser couch. The chief rise of temperature occurred when the

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thermometer was placed on the flexor surface of the forearm about 2 to 4 inches above the wrist. Sometimes both hands, at other time one hand only, of the patient grasped a double or single electrode, connected with one terminal of the solenoid, while the other terminal was in communication with the metal plate at the back of, and under the couch. With one exception there was a marked rise of temperature ranging from 1·4° to 17·4° Fahr., the rise varying according to the locality chosen, the amount of current employed, and the holding of the electrode with both hands, or with one hand. At the conclusion of fifteen minutes, as I have said, the current was turned off, the patient remaining in the same position. With only one or two exceptions the temperature immediately began to fall, and continued to do so during the succeeding fifteen minutes, though the fall was not, as a rule, so rapid as the rise. The greatest rise in temperature invariably took place on the flexor surface of the forearm when one electrode was held in one hand, or in proximity to an electrode placed on the abdomen. The charts show that the rise of temperature on the surface of the lower limbs was not nearly so rapid or so marked as that of the arms. Still there was generally a rise. Further, when a thermometer was placed upon a forearm and another on a lower limb, the rise of temperature on the forearm was greatly in excess of that of the lower limb.

Before throwing the charts on the screen, let me show you a slide illustrating Gaiffe's apparatus. You will observe that the couch is situated so that the left side of the patient is ordinarily next the cabinet. The left hand terminal of the solenoid is connected by an insulated cord with the back of the couch, while the right hand terminal is in connection with one extremity only of the double electrode which the patient grasps in both hands. I describe it as double, for both extremities are of metal, united with one another through an insulated portion which rests on the knees of the patient.

Looking now more closely at the charts*, and considering first those cases where both hands grasped the double electrode, it will be seen by examining Group I, where the temperature was taken on the extensor surface of the right forearm, 2 or 4 inches above the wrist, that there was an invariable rise during the fifteen minutes while the patient was exposed to the high frequency currents. The rise varied according to the weight and temperament of the individual, and to the amount of current employed. Chart No. 1 (*see* fig. 1) shows a rise of 1·4° Fahr., the amount of current being only 250 milliampères. When 500 milliampères were

* Of which several are here reproduced.

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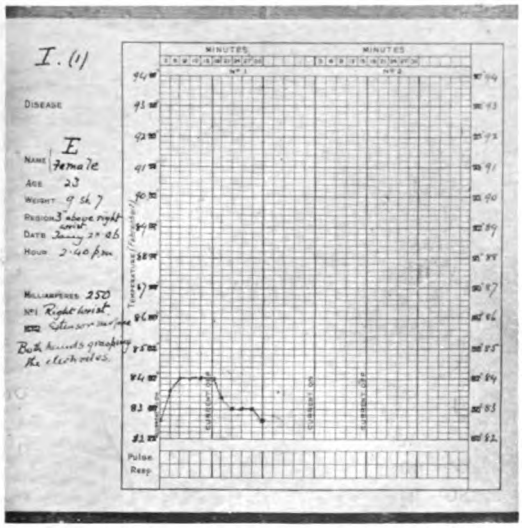

Fig. 1.

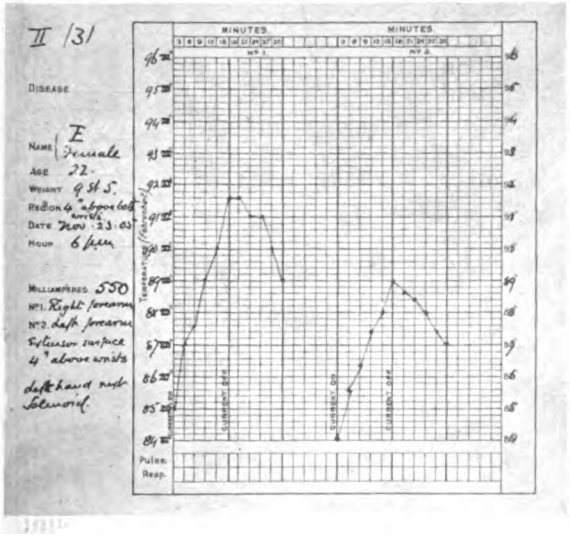

Fig. 2.

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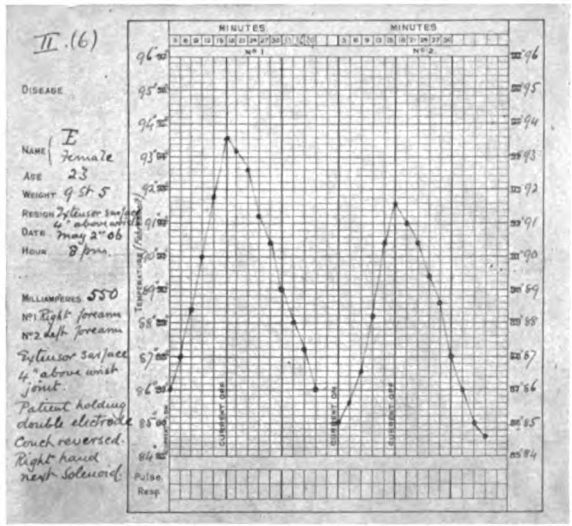

Fig. 3.

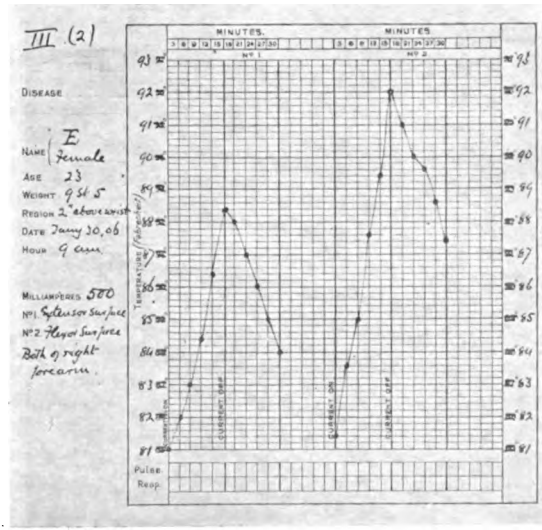

Fig. 4.

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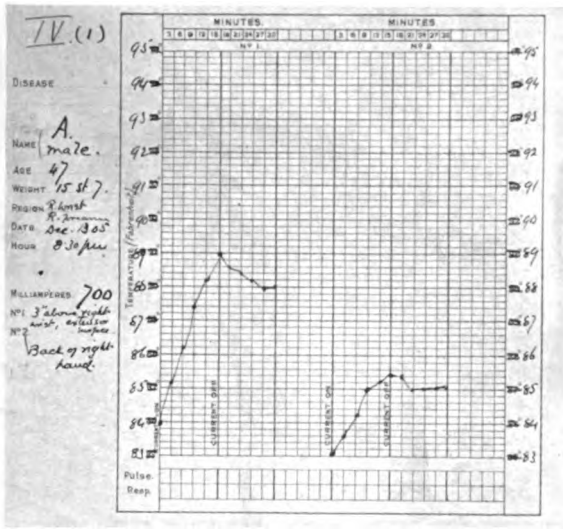

Fig. 5.

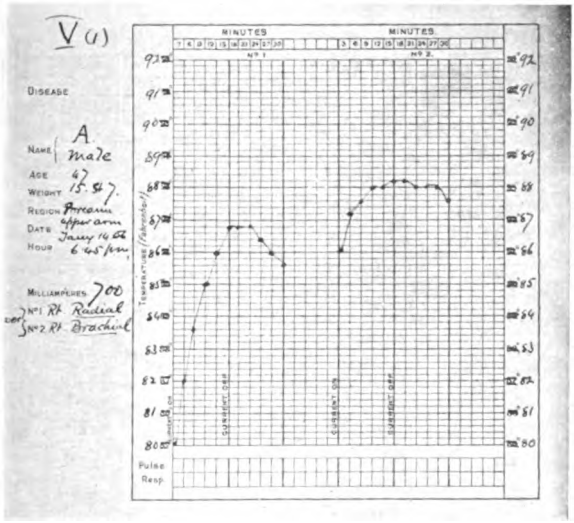

Fig. 6.

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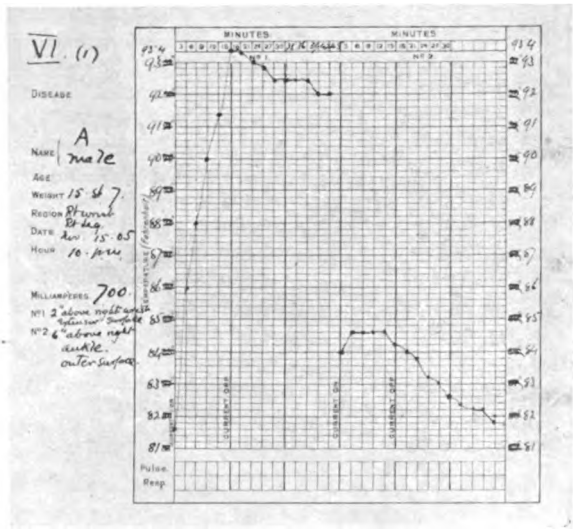

Fig. 7.

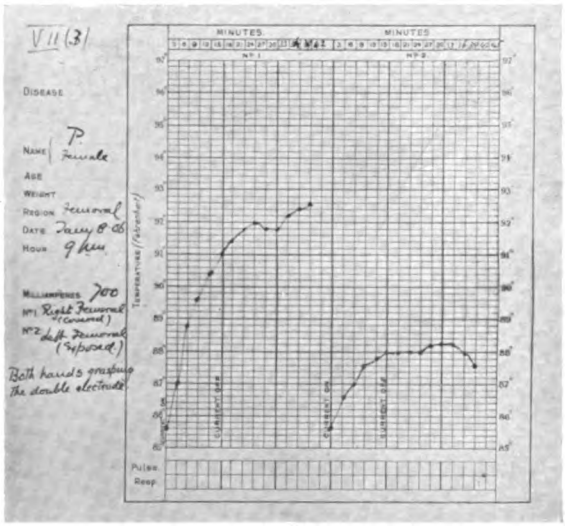

Fig. 8.

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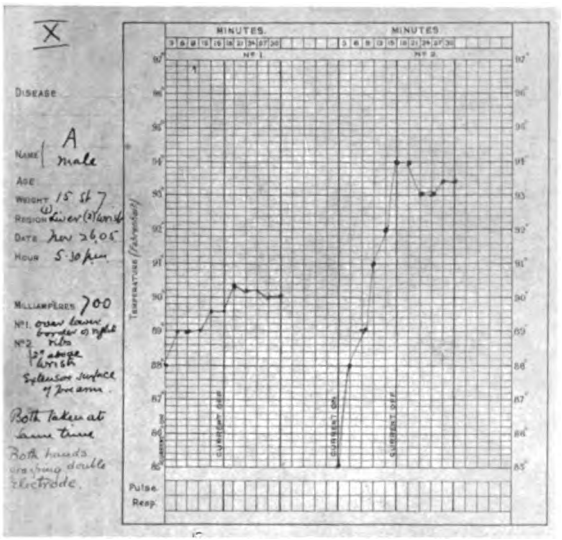

Fig. 9.

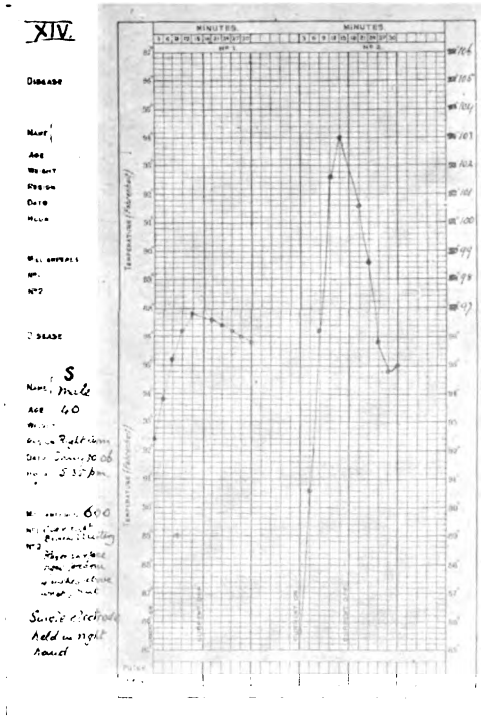

Fig. 10.

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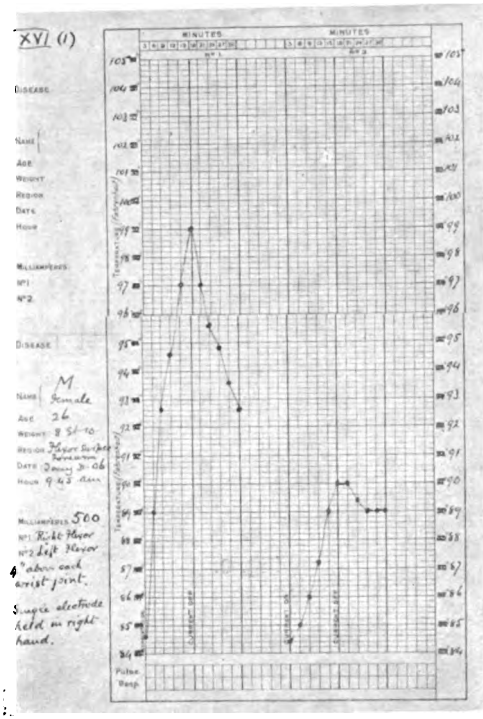

Fig. 11.

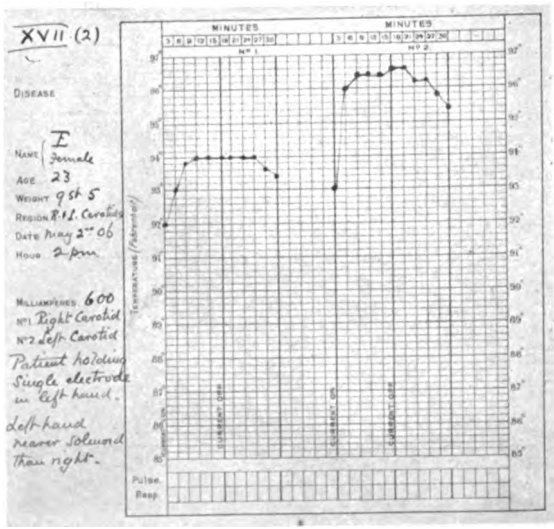

Fig. 12.

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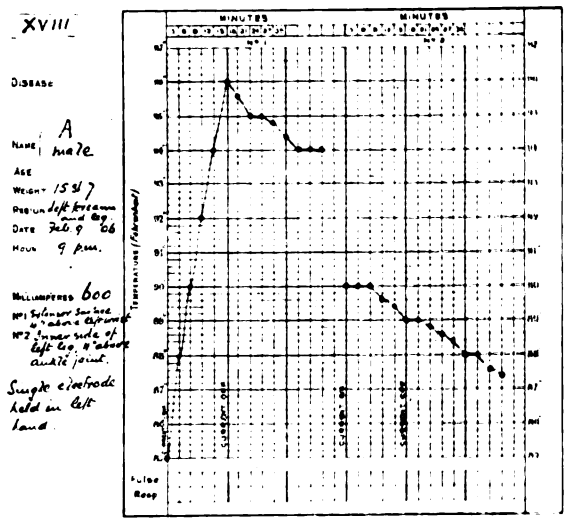

Fig. 13.

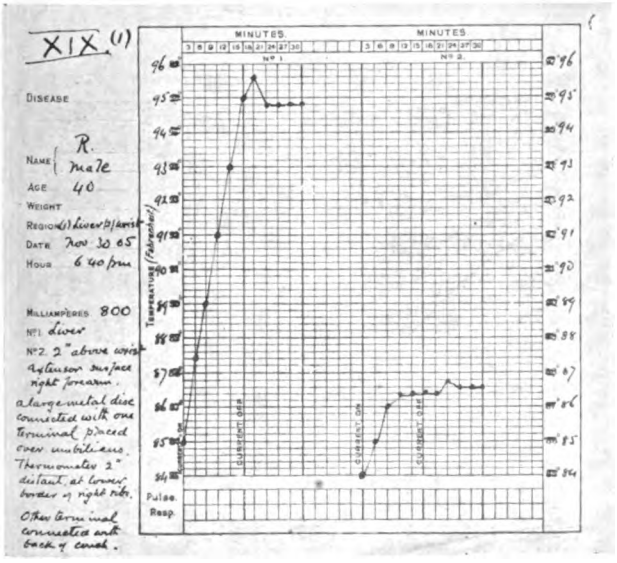

Fig. 14.

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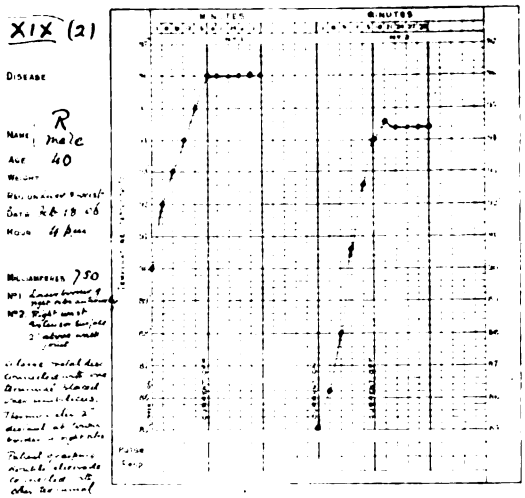

Fig. 15.

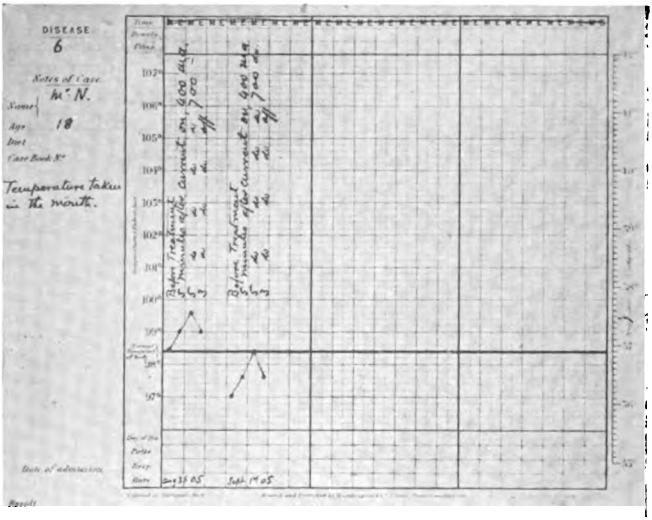

Fig. 16.

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used the rise was greater. In No. 2 this amounted to 9·2°; in No. 4, to 8°. After the current was switched off, as shown on all the charts by a thicker vertical line, there was usually a fall, but the temperature during the next fifteen minutes seldom came down to the original level; the rise of surface temperature was nearly always partially retained. As a rule the fall began immediately after the current was cut off, though Nos. 5, 6, and 7 are exceptions. No. 5 is interesting: here a further rise of 1·8° occurred during the six minutes following the cutting off of the current. The patient was a doctor who had been born and brought up in the Mauritius, and who maintained that he always possessed in his blood an increase of "calories."

Group II includes cases where the temperature was taken simultaneously on both forearms, on the extensor surface, 2 to 4 inches above the wrist. In all the six charts it will be noticed that the temperature was higher on the right forearm than on the left, though the right hand grasped the double electrode at a point further from the terminal than the left (*see* fig. 2). Here again the rise in the temperature was proportionate to the rate of current. In chart No. 5, an initial difference of three degrees exists between the temperatures taken at corresponding points above the right and left wrists. In chart No. 6 of this group (*see* fig. 3), the temperature over the right forearm is higher than that over the left, though here the couch was reversed and the patient was made to lie with the right hand next the solenoid. The greater rise, therefore, on the right forearm must be due to the fact that it is the right, and not merely to the presence of impedence at the point of exit of the current.

It has been suggested that the rise of temperature occurs chiefly along the course of the lymph channels, these in the forearm being found near the flexor surface. Chart No. 1 of Group III shows that the rise on the flexor surface is only slightly in excess of that on the extensor surface, the former ranging from 84° to 91° = 7°, the latter from 85° to 91° = 6°. The temperature of both surfaces rose slightly after the current was cut off, the flexor surface recording an excess of 0·2° over the extensor. But charts 2 (*see* fig. 4) and 3 show distinctly the rise to be greater on the flexor surface of the forearm. No explanation is apparent why in No. 3 the rise on the extensor surface is here so limited, when at other times the rise of temperature taken in this locality is so marked.

This chart from Group IV (*see* fig. 5) discloses the fact that the temperature on the surface of the back of the hand grasping the electrode is not so high as that of the extensor surface of the forearm, taken 3 inches above the wrist. On the hand, the rise is 2·4°, while that of the forearm amounts to 5°.

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This chart from Group V (*see* fig. 6) illustrates the difference in the rise of surface temperature over the forearm and over the brachial artery of the same limb. It is here to be noted that the initial temperature of the upper arm was 86° before the experiment was commenced, viz., 6 higher than that of the lower end and extensor surface of the forearm of the same side, but on the other hand it is to be remarked that the rise of temperature on the forearm, amounting to 6·8°, is greater by 4·6° than that of the upper arm.

In Group VI (*see* fig. 7) the temperature was taken simultaneously on the extensor surface of the forearm and the outer surface of the right leg. Here somewhat peculiar features revealed themselves. The forearm temperature rose from 81·6° to 93·4° Fahr., viz., 11·8°, and it is specially to be noticed that during the first period of three minutes the rise amounted to no less than 4·4°; in the second and third periods of three minutes to 2°; in the fourth to 1·4°; and in the fifth to 2°. You will agree with me that this rise is somewhat startling, but it may be connected with the fact that the patient experimented upon weighed 15 st. 7 lbs., and that 700 milliampères were employed. In this case the fall was only partial. In twenty-seven minutes, after the current was cut off, the temperature had fallen only 1·4°. As I have already stated, the temperature was taken simultaneously in the leg, where a rise of 0·6° was noticed during the first three minutes; no change occurred for nine minutes, and then the temperature fell 0·4°. Then the current was cut off, and a rapid fall was noticed during the next twenty-seven minutes to a point 2·2° below the original temperature. In No. 2 the same patient had again a remarkable and rapid rise of 10·8° in the forearm temperature, and only a slight rise in the leg. Unfortunately, the temporary derangement of the thermometer prevented a complete record of the fall in the forearm being taken. Chart No. 3 is also a good example of this group.

Group VII shows the temperature taken over the femoral artery on each side. All three charts of this group show the unusual feature of a uniform temperature at the outset on the two limbs. In No. 1 the left thigh records a greater rise than the right; in No. 2 there is an almost identical rise in the two limbs; in No. 3 (*see* fig. 8) the covering up or the exposure causes a variation in the temperature, the covered groin showing a rise of 6·2°, while the exposed locality shows a rise of only 2·4°. In both cases there was a further rise after the current was cut off, chiefly on the covered side.

The chart from Group VIII shows the variations of temperature taken on both legs, 6 inches above the ankle.

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Here the rise is identical, though from different starting points, and the fall is also almost similar.

One would have thought, when the patient lay on the couch, grasping the double electrode and the current was closed by one hand of the operator being put in immediate contact with the patient's leg, while the operator's other hand grasped an electrode in connection with the other terminal, that the temperature of the leg so touched would be raised to a higher level than that of the other. Chart No. 1 of Group IX shows, however, that the difference in the rise is only slight. The left leg which was in contact with the operator has recorded a rise of 2·8°, while the right leg lying exposed but untouched by the operator showed a rise of temperature of 2·6°. There was, however, a dissimilarity in the way the temperature fell after the current was cut off. In No. 2 of the same group the rise is seen to be more marked on the right or untouched limb, viz., 3·2°, than in the limb held by the operator, viz., 0·6°. This anomaly may be possibly due to the fact that the right limb was covered with clothing, while the left was exposed. It will be noticed that there is a distinct further rise of temperature after the current was cut off, the patient's foot being still grasped by the operator. No. 3 is perhaps the only noticeable example showing the reverse of the ordinary experience. On both legs the temperature fell rapidly, the fall during the fifteen minutes after the current was switched off was less rapid in the limb held by the operator, viz., 0·6°. On the untouched limb the fall was 1·8°. In neither leg was there any rise of temperature. No. 4 is from the same patient as No. 3, and was taken a few minutes after she had acted as operator. There is again a fall in the temperature of both legs; but the fall on the leg (the left), in contact with the operator during the fifteen minutes after the current was switched off, amounted to 0·8°, while the fall on the other reached 1·8°; thus showing similarity to chart No. 3.

This chart of Group X (*see* fig. 9) shows how the temperature on the forearm compares with that over the region of the liver below the right ribs. The rise of the forearm temperature is, as usual, considerable, viz., 9°, while the temperature of the right hypochondrium, which was originally 3° above that of the forearm, rose only 1·6°.

Turning now to the series of charts recording the surface temperature when a single electrode was held in one hand, we find that a rise of temperature in the forearm of the hand grasping this electrode is exceptionally great. This chart of Group XIV (*see* fig. 10) shows the temperature taken on the flexor surface of the forearm, 4 inches above the right wrist, and also over the right brachial artery, *i.e.*, of the same limb. The subject was a medical friend of my own. It will be

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noticed that in twelve minutes the phenomenal rise of 17·4° took place on the flexor surface of the forearm. Indeed, my friend was unable to bear the current any longer, not so much on account of the heat in the arm, but because the whole limb swelled to such an extent, apparently from the dilatation of the deeper blood vessels, that the tension of the bandages and elastic bands which held the thermometers *in situ* was unbearable. Immediately after the current was switched off, relief of the tension occurred. The rise of temperature over the brachial artery amounted to only 4·6° Fahr. You will note the difference in the initial temperatures, that over the brachial artery being 6·8° higher than that over the forearm.

The chart of Group XV shows the temperatures taken on the flexor and extensor surfaces of the right forearm, while the patient, a female, held a single electrode in the hand of that arm. The rise in each case is about the same, viz., about 13°.

Group XVI, chart No. 1 (*see* fig. 11), shows again a marked rise of temperature, viz., 14·4° on the flexor surface of the right forearm, the hand of which was holding the electrode, while there is at the same time a considerable rise, viz., 5·6° on the flexor surface of the left forearm, the hand of which did not hold the electrode. Chart No. 2 records the temperature of another medical friend, where the result is somewhat similar. Here the left hand grasped the electrode.

Group XVII, chart No. 1, where the patient held a single electrode in the right hand, shows that the temperature over the right carotid rose higher than over the left carotid. But chart No. 2 shows (*see* fig. 12) that if the single electrode be held in the left hand, the temperature rises more over the left carotid than over the right.

Group XVIII (*see* fig. 13), where the patient was charged by a single electrode in the left hand, shows the ordinary rise on the extensor surface of the forearm and a fall, curiously enough, on the corresponding lower limb.

In Group XIX, chart No. 1 (*see* fig. 14), a large metal electrode connected with one terminal was placed on the abdomen, and the thermometer was fixed at a distance of 2 inches from this electrode, beneath the border of the right ribs. The other terminal was connected with the metal plate at the back of the couch. Here the rise over the abdomen amounted to 10·6°. Meanwhile the temperature was taken on the extensor surface of the right forearm, 2 inches above the wrist, where a rise of 2·4° took place, though the patient's hands were not in contact with any electrode. Chart No. 2 of this group (*see* fig. 15) indicates how conditions are altered when the patient grasps the double electrode, connected with

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one terminal, in both hands, while the metal disc is laid on the abdomen as before. In this chart the rise of surface temperature over the lower border of the liver is 6°, while in chart No. 1 the rise amounted to 10°. On the other hand, the rise of temperature on the forearm in the second case amounted to 9°, while in the first case the temperature rose only 2·4°. It should be noticed that in the first case 800 milli-ampères were used, while in the second only 750 were applied.

Group XX shows what takes place when a large metal electrode connected with one terminal is placed in contact with the sole of the bare foot, while the other terminal is connected with the back of the couch, the hands of the patient being free. It will be seen that the temperature rose in patient R. and fell in patient D. over the right femoral, while in both cases it rose on the right leg. The temperature in chart No. 1 was taken on the outer surface of the right leg and over the right femoral artery, and in chart No. 2 on the inner surface of the right leg and over the right femoral artery. The patient D. is the same as showed the rapid fall of temperature in Group IX, charts 3 and 4, when the foot was being electrically massaged by the operator. The fall, therefore, recorded over the femoral may be due to the idiosyncrasy of the patient.

The only difference in the method of experiment in Group XXI is that, while the electrode was placed as before in contact with the foot, the patient here held the double electrode in both hands. In chart No. 1 of this group, the temperature did not rise so much over the femoral, while in chart No. 2 there is a slight and sustained rise of temperature.

In order to prove that the rise of temperature indicated by the thermometers is not due simply to the action of high frequency currents on the mercury, I placed the thermometers on the couch in the position usually occupied by the patient. No effect, however, was produced when the current was fully turned on, showing that the rise of the mercury when the thermometers were applied to the patient was due to alterations of temperature that had occurred on the surface of the body of the living subject.

The six charts which I now show you (*see* fig. 16) demonstrate, by way of contrast, the effect of high frequency currents on the internal temperature of the body. It will be seen that when the current is applied to the patient, while on the couch, a rise of temperature usually does occur, but only to the extent of half a degree, to a degree and a half. The temperatures were taken in the mouth—before, during, and immediately after high frequency treatment.

Viewing now the results of these experiments as a whole, it seems certain that high frequency currents do produce a rise of temperature on the surface of the human body, varying

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according to the dosage, the locality chosen, and the method of application, and we cannot now wonder when patients tell us after treatment that they experience a pleasant sensation of warmth throughout the body. This rise of temperature is undoubtedly due to the action of high frequency currents on the vasomotor system, which, under the influence of the currents, permits of increased peripheral circulation. Indeed, as I have already said, when referring to the experience of one of my medical friends, there must be a dilatation of the deeper vessels also. This doubtless explains why the blood pressure, as shown by the sphygmometer, is lowered. Afterwards, when the current is cut off and the surface temperature falls, the peripheral and deeper vessels regain their normal size, and as a consequence the blood pressure rises to its original height.

Hence, too, we may with greater confidence employ these currents when treating patients of advanced years, where perhaps the heart muscle is feeble. If we cannot directly stimulate the heart's action, we can at least lessen the resistance which it has to overcome while doing its work.

Again, with an increased peripheral circulation, there must be a withdrawal of blood from the brain and the organs of the abdomen. The circulation as a whole, therefore, must be aided, and more nourishment be conveyed with greater rapidity to the tissues. Hence more perfect metabolism occurs, and the individual is placed in better circumstances to oppose and to overcome the effects produced by the strain of daily life, and also by various diseases, such as influenza, which depress the functions of the body and lessen their activity. It need not surprise us, therefore, that in our experience we find men and women of all ages benefiting directly and indirectly by a course of high frequency treatment, and stating that they feel invigorated and refreshed. The treatment, as we know, is painless and agreeable, and it in no way interferes with the prosecution of daily duties.

All readers of the Journal will deplore the accident which has deprived, not only France, but the whole scientific world, of the knowledge and ability of M. Curie. The appointment of Madame Curie to the Professorship rendered vacant by her husband's untimely death will be universally approved. The scientific insight of Madame Curie, as shown in the discovery of Polonium and of Radium, are worthy of the highest recognition.

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X-RAYS IN THE TREATMENT OF CARCINOMA AND SARCOMA.

By CHISHOLM WILLIAMS, F.R.C.S. (Edinburgh).

(Continuation from page 77.)

Improved Apparatus.—For the past year or so I have been working in the following manner: The current obtained from an alternating supply at 110 volts is passed through a large Nodon valve, and of this rectified current 3 to 4 ampères is used at 30 to 35 volts to excite a 16-inch induction coil with a "dipper break" which is run by a small motor. Attached to the axle of the motor is a "tachymeter," marked up to 15,000, which records on a dial the number of plunges of the dipper; ordinarily this takes nearly fiteen minutes to run off, but with the motor running at its highest speed it takes only six minutes. The dipper is adjusted to plunge 1 centimetre into the mercury. The special stand, made for me by Mr. Dean, has proved of the greatest service in treating cases of cancer in the vagina and rectum. The tube is fixed in the ordinary pattern London shield of lead glass, to the opening in front can be fitted lead glass speculæ of various sizes, 3 to 6 inches long. At the junction of the shield is a metal notch for the reception of Sabouraud's pastilles which I have found fairly uniform in their indications if their examination is conducted quickly. To ascertain the quality of the rays I use Dean's modification of Benoist's radiometer on a sun and planet system, and in the majority of instances my tubes register between 5° and 8°, and they are easily adjusted to any required degree by means of the osmo-regulator. A Villard's soupape is interposed between the coil and the tube to arrest the reverse current, whilst a milliampèremeter is also fixed in the coil circuit and registers up to 2 milliampères. A spintermeter exactly measures the spark gap which, with me, varies between 3 and 6 inches. The apparatus is the same as that described by Dr. J. M. H. McLeod,* with the important alteration that the tube stand is arranged to project from the face of the framework for a distance of 3 feet, and this modification is particularly suitable for treating uterine and rectal cases with the patient lying in the lateral position. With another installation consisting of a 12-inch coil, a Wehnelt break, and a regulating tube on the alternating main, much work has been done. The drawback is the constant renewal of the

* Dr. McLeod. *British Medical Journal*, September 19th, 1905.

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platinum points of the Wehnelt break and the somewhat rapid deterioration of the tubes, when worked in this way.

The question as to whether the anticathode should be red hot or not, is in my opinion unanswerable in a dogmatic way, as so much depends on the idiosyncrasies of the tube, and possibly other parts of the apparatus.

Standard Dosage.—Would that we could formulate a standard dose for X-rays as we can in the case of some drugs, but at present this appears impossible, and we can only hope that in the near future it will become possible to give an exposure that will produce a definite effect. At present, we can only compare our work in a very general way, owing chiefly to the divers kinds of apparatus in use, and the idiosyncrasy of the patient is also a factor that cannot be neglected when considering the dosage. My observations lead me to think that fair people burn more readily than dark and that dark people become pigmented the more easily. With increased experience and knowledge of the behaviour of X-rays, and with better regulation of our apparatus, the idiosyncrasy of the patient will become a less important factor. With my apparatus, as at present arranged, I find that a dose of 3,000 to 5,000 Benoist units is given at each sitting.

I also use a method of measuring the X-rays devised by Dr. Milton Franklin and manufactured by Messrs. Newton and Co. It is based on the power of X-rays to ionise the gases through which they pass. It makes use of the rate of discharge of a charged gold leaf electroscope and it works in my hands very reliably. By its use the relative activities of two radiations may be compared with great accuracy and expedition, and if one of them is the standard unit of activity, or bears a known ratio to the standard, the value of the other in terms of the standard will be easily deducible. It is only necessary to charge the electroscope, which is in a ray-proof box, and to excite the tube, and then to open the door of the box and expose to the rays, noting carefully the rate of fall of the filament under their influence. The rate varies directly with the activity of the radiation. In this way a definite standard is provided.

Alleviation of Cancer Pain.—That the pain of malignancy can be much alleviated by X-ray treatment is common knowledge among those who have any experience of this form of treatment. The pain due to the dragging or contraction of the scar does not seem to yield so readily as "growth" pain. Pain produced by pent-up discharge or the disintegration and liquefaction of the malignant cells can only be relieved by the patient's absorptive powers or by an exit naturally or artificially produced. In uterine cases it is important to dis-

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tinguish between the period pain and the pain of the growth itself. A patient with a large cauliflower excrescence of the cervix had had no period for over fourteen months prior to the commencement of treatment. Seven weeks later, with daily applications, the growth had disappeared, although the whole of the contents of the pelvis were still lumpy and matted together, but to my great surprise the pain, which had decreased to almost nil, came back with renewed vigour, although the cervix looked perfectly healthy and the discharge was of a normal character. After the pain had continued for eight days I suspended treatment as I thought the X-rays were possibly the cause, but in a little while the patient returned with the cheerful intelligence that she had passed through a copious menstrual period, with the cessation of which all pain had vanished. Her periods have been most regular since and the parts are gradually assuming their normal condition. There has been no return of disease during the past two years.

Glands.—In the majority of cases that I have had to treat where there was much glandular enlargement, it is a curious fact to note that the glands actually infected became of stony hardness before they disappeared. I am led to the conclusion that frequently enlarged glands are only affected with simple inflammation from irritation of the secretions of the original growth and not from actual infection. In one patient who had an enlargement of the glands many months after the breast had been removed, these were undoubtedly infected, although the operation scar was white and perfect, but readily disappeared with a few months' treatment, though this patient succumbed to a recurrence eleven months later, during which time no X-rays were applied. In another case, a woman, aged 48 years, who had primary carcinoma of the left mamma, quite two-thirds of the gland was involved, and there were many lumps in the axilla which practically filled that space. She had refused any operative measure.

Under X-rays administered for three times a week for over four months, the lumps cleared up and the breast then seemed to contain a hard tumour much less in size than half the whole gland; this was then removed and proved to be an ordinary scirrhous carcinoma of a very fibroid character. This patient has been in excellent health since October, 1903, and continues so at the present time.

The following case well exemplifies some of the above points: The patient was a single woman, aged 64 years. She attended at St. George's Hospital in March, 1899, for a tumour in the right breast. She was admitted under the care of Mr. J. W. Hayward, who removed the breast containing a scirrhous carcinoma. In July, 1901, there was a recurrence

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in the scar and axilla, for the relief of which she was operated upon by Mr. H. C. Jeffreys. Six months later, in December, 1901, Mr. Clinton T. Dent removed several lumps from the right axilla. This patient then remained free and well for nearly three years, but in March, 1904, she consulted Mr. L. A. Bidwell at the West London Hospital. There was then one small ulcer at the inner end of the scar with several lumps in the scar and in the axilla. They were adherent to the skin and to the underlying tissues; also there was great œdema of the whole of the right arm. Microscopically the ulcer proved to be epitheliomatous. X-rays were applied twice a week with an exposure of from five to ten minutes; the ulcer readily healed in a few weeks, and the axillary lumps one by one broke down and became simple hæmatomas, and were from time to time tapped and yielded disintegrated blood, the small incisions closing quickly. In June, 1904, treatment had to be stopped for a somewhat extensive dermatitis. It was resumed in August of the same year on account of pain in the axilla, which she believed from previous experience was not like the pain of cancer. From that time onwards she has shown no sign of malignant disease, but has had intermittent treatment with the object of trying to soften the lumpy scar in the axilla, and to relieve the œdema of the arm, which still persists in a minor degree. The patient has gained 18 pounds in weight in the past two years. She has practically no pain now, and is in a good state of general health. She was exhibited before this Society in October, 1905.

If the consensus of opinion of the members of this Society were taken as to the relative value of X-ray and other forms of phototherapy I believe the majority would be in favour of the X-rays in the treatment of all forms of carcinoma and sarcoma. I well remember the day on which the evening papers announced Röntgen's brilliant discovery and how at first, with a conservatism natural to our profession, we treated the statement as an exceptionally smart piece of yellow journalism, but within a week, imperfectly it is true, we observed the shadow of the bones in the fingers of our own hand and our scepticism was turned to astonishment. Proceeding onwards, we thought it astonishing that some little superficial cancers disappeared under X-ray applications, and had not our scepticism received such a shock at the diagnostic power of the rays we should have been even more sceptical. But the fact remains, that most of such little growths can be alleviated by X-ray treatment. Who can say how soon in the future with increased knowledge of cancer and of the rays the alleviation of the larger growths may not be attained?

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Thirty-sixth Ordinary Meeting of the Society was held at 11, Chandos Street, W., on Friday, April 27th, 1906, at 8.30 p.m. The President, Mr. J. HALL-EDWARDS, in the Chair.

Present: Fourteen members and one visitor.

The minutes of the Thirty-fifth Meeting were read and confirmed.

Dr. DAVID ARTHUR showed an X-ray table designed by himself, which was in use in the West London Hospital. He pointed out the arrangement of its different parts and its several advantages. The tube-holder was beneath and the plate-carrier was above. These two parts moved together, and the tubed could also be raised or lowered independently, or could be displaced as desired for stereoscopic work. The position of the plate could be accurately adjusted by means of a preliminary examination with the fluorescent screen, and this permitted of the employment of small sizes of plate exactly over the spot to be photographed, and thus economies could be effected. In this way he had found that a saving of 75 per cent. of the cost of plates could be secured. The contrivance also lent itself admirably to stereoscopic work, and two photographs from slightly different points of view could readily be taken. The plate could be got exactly where it was wanted, and very often a common *carte de visite* size would do. An ordinary photograph of the kidney ought not to require more than a whole plate size of negative.

It was not an expensive table, the cost was 10 guineas, and it was made by Mr. Parker, of Shepherd's Bush.

The CHAIRMAN said that they were very much obliged to Dr. Arthur for bringing the table to the notice of the members of the Society. Any arrangement for making exact measurements for localisation was to be welcomed. The table was very much like a design of his own. In that couch the surface was perfectly clear before the patient was placed on it. The upper part, which was very similar to the one shown, lifted completely off, and the rails upon which it slid

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were at the side of the couch so that it was quite easy to get the patient in position. It was very important to be able to locate the central axis of the rays from the tube by means of a measuring tape. He had very great difficulty in getting the makers to follow out his suggestions. Some of his own tables, as he found out afterwards, arrived in India without any arrangements for making measurements at all. Thus, in his opinion, the chief point of the whole thing was missed. A very simple indicator could have been supplied with each table to show the exact position of the anticathode at any time The advantages of being able to use small plates were very great, especially in view of the fact that hospital committees often grumbled at the price paid for those articles. Still, it was often important to secure a good view of surrounding parts. He presumed that Dr. Arthur had used the couch for a sufficient length of time and had found it act well. He could not say that he had found his own couch to be as successful as he had expected it would be. He thought the arrangement shown by Dr. Arthur seemed to present some minor difficulties. It would be difficult, for instance, to take a lateral view of one knee with it, because the other leg would be in the way. In such cases where the plate could not be got near the knee he thought better results could be had when the plate was below the patient. At the same time the couch was exceedingly ingenious.

Dr. W. F. SOMERVILLE then read a paper on "The Influence of High Frequency Currents on the Surface Temperature of the Human Body." It was illustrated by a large number of lantern slides showing some twenty groups of charts giving particulars of his experiments. The paper will be found *in extenso* elsewhere in this Journal.

After the reading of the paper the CHAIRMAN said that all would agree in thanking Dr. Somerville. Members would admire his enthusiasm, and especially as the present one was the second successive meeting for which he had come all the way from Glasgow. The subject was an important one, and he hoped that the members would discuss it fully.

Dr. LEWIS JONES joined in thanking Dr. Somerville for his paper, and congratulated him very heartily upon the example of scientific work which he had done in connection with high frequency currents. The subject needed more work of that class before a judgment as to the merits of high frequency could be formed, and such a mass of information as that which Dr. Somerville had brought forward in his paper required a good deal of time and attention for its assimilation, and it was not easy to discuss it, at short notice,

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in the manner it deserved. He looked forward to seeing the paper in print in order to scrutinise the charts more thoroughly and to arrive at the full meaning of the experiments. It would have been interesting to have had some more information as to the fall of temperature after the current was switched off, and in this respect the charts were rather tantalising, for they terminated before one could see exactly what the character and the duration of the descending part of the curve might have been. Perhaps Dr. Somerville had in certain instances followed the falling curve right through to the end. If so, it would be interesting to know whether, after the fall was over, the temperature of the patient returned to the same level as it had before the treatment. He should also like to ask in what proportion the patients were normal, and in the case of those who were not normal, what difference was made by the conditions of the disease from which they suffered.

Dr. HORACE MANDERS said that Dr. Somerville's results had evidently been obtained after very careful and critical experiment, but in the problems so difficult as those relating to high frequency it would be indeed a wonder if everything were clearly understood from the outset. The first thing which he wished to mention had reference to the differences in the temperatures of the two sides of the body. He understood Dr. Somerville to say that the double electrode was attached to the solenoid by one lead only, and that lead on the left side. Electricity travelled so fast that he did not think that any appreciable difference in charge could follow from the mode in which the electrode was held. Dr. Somerville had mentioned that the temperature in the right forearm was greater than in the left. He had not tried experiments on surface temperatures, but he had found larger currents to pass through the right arm than the left. There was a curious exception to this, however, the case of left-handed men. In the right arm the muscular development was larger, the blood supply is greater, and perhaps there was more lymph or more fluid in that arm than in the left, and this might be the explanation. He thought the rise of the temperature after the cessation of the current was due to a continuance of the action. The physiological process did not stop at the moment of stopping the electrical action. Cases were known where the temperature rose after death, as for instance in pneumonia.

Dr. Somerville also stated that the temperature on the flexor surface rose higher than it did on the extensor surface. This was doubtless due to the greater amount of lymph on the flexor surface. All the arteries and veins were situated on the flexor surface, and perspiration was more free on the

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flexor surfaces, so that presence of more moisture on that surface might lower the resistance there.

In one of the series of charts the weight of the patient was 15 stone, and he took 700 milliampères. The weight of the body was important in these experiments, as he had seen to be the case in many operations undertaken, however, not with a view to the external but to the internal temperatures. With a machine running steadily under fixed conditions it was only necessary to put two patients of different weights on the couch in order to see the difference in the magnitude of the current. In the case of the patient weighing 15 stone the temperature was seen to fall very slowly, as though following the laws of cooling bodies.

It might be asked why the arm gave higher temperature readings than the other part of the body? He thought this was due to the concentration of the current. In the case of the electrode held in the hand there was a definite feeling of warmth in the wrists, and the further one got away from the electrode the less would be the temperature. If the hand were placed on any part of the body of a patient receiving high frequency currents he felt a definite sensation of warmth in that part, as the current was again concentrated at that point.

Dr. Somerville mentioned one case in which the internal temperature went up. He thought this effect was invariably produced, and he had found that the temperature rose more in phthisis than in any other disease. He had put a thermometer in the mouth of a patient and had watched it rise to a degree above the normal, after which he usually moderated the current or cut it off altogether. He did not know exactly how long that rise of temperature would last, but knew that it lasted for some time, and therefore he cautioned patients whose temperature might not have reached the normal level, against going out in the evening after treatment.

Dr. DAVID ARTHUR said that it was generally known that the surface temperature rose under the influence of high frequency currents, but no one, so far as he knew, had brought forward exact data as Dr. Somerville had done in his paper. As a better test of the influence of the currents he would suggest to Dr. Somerville an examination of the uric acid and the urea generally. He had not done anything in the way of quantitative analysis himself, but had found that under high frequency treatment the urines became thick and turbid. Some interesting cases had come within his experience, in which an attack of acute gout had been brought on through high frequency applications.

Dr. G. B. BATTEN said that just as there was a boom in high frequency a year or more ago, so now there might be

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said to be a "slump." Still, many workers were convinced of the value of the treatment, but a paper like Dr. Somerville's would go farther towards convincing the sceptic than any mere expression of personal opinion. He wished to ask whether Dr. Somerville felt that he had been able to eliminate all sources of error. He did not quite realise how the thermometer was employed. With a rubber band round the upper arm to which the thermometer was applied, might not the venous congestion explain the special rise of temperature? The arm was peculiarly sensitive to pressure, and with a rubber band one would get a constriction at that part. One needed to eliminate all such bye-reasons, that is to say, reasons which were not really true reasons for the rise of surface temperature. It would be interesting too to know whether Dr. Somerville found great variation between the temperatures of healthy people and of those who were suffering.

Dr. ARMSTRONG asked whether the ordinary temperature of the skin was stable in the case of the persons examined, also to hear some day the deductions that Dr. Somerville would draw from his experiments. He had noticed the effect of high frequency on the elimination of urea, and in the case of one patient, the urea which had been below 100 grains in the twenty-four hours went up steadily to 400 grains and had remained at that level. With uric acid he had not found any great increase, unless perhaps in cases with a minus excretion and not a plus formation of uric acid. If a patient's tissues were loaded with uric acid an attack of gout might be produced by high frequency applications.

Dr. REGINALD MORTON thought that one or two little criticisms might perhaps be made. He would have liked to see the record of the pulse rate along with that of the temperature. Such a record might have given some further light. His previous opinions, which had been fully borne out by the paper, was that the effect on the surface temperature was due to an action in causing dilatation of the cutaneous capillaries. It would be interesting to know how far ohmic resistance had anything to do with high frequency conduction. He had doubts upon this question, because of the wellknown effect in which a single turn of wire will have an influence so high as to light an incandescent lamp arranged in shunt with it, although the ohmic resistance of the wire may be so low as to be hardly measurable; but the wire will only light the lamp if it is brought round it in a circle. In the case of a person holding the electrodes in the hands, there might be on account of the circular area enclosed by the arms a possible explanation of the resistances which are sometimes experienced in high frequency.

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The CHAIRMAN said he wished again to express his thanks to Dr. Somerville, and would touch upon one or two points which Dr. Somerville had not made quite clear to him. One of these points had reference to the method in which the external temperature was taken by means of the thermometer. How long did Dr. Somerville leave the thermometer in the position in which he fixed it before starting his experiments? Again, he had not shown any records of a repeat experiment, although doubtless he possessed some. He would like to know whether he had repeated the same experiment on the same person, and whether the results in the two cases coincided or differed. He was led to ask the question because he thought the surface temperatures of most of the cases seemed abnormally low at the commencement, suggesting that they came in out of the cold just before the trials, or that their normal surface temperature was very low. Also in the charts which gave the temperature of the covered parts, there was not the same difference that there was in other cases where both sides were exposed.

Dr. Somerville has suggested that in some cases the temperament of the patient might have had some influence upon the temperature. It seemed curious that in one or two cases the temperature should have fallen instead of going up. Had Dr. Somerville any idea as to why this should have taken place? He thought with Dr. Morton that the pulse rate should have been mentioned. On the charts nothing was put down under the heading of disease: was it to be inferred, therefore, that all the patients were normal? Were there nervous persons among them, or persons suffering from any disorder?

He did not think that ohmic resistance had anything to do with the matter. In fact, it had yet to be proved that high frequency currents did not pass any deeper than over the exterior surface of the body. The question had been debated in this Society two or three years, but from the experiments and views brought forward at that time nothing conclusively proved that high frequency currents passed through the body.

He was sure that Dr. Somerville would not regard the remarks made criticisms, but rather as furnishing suggestions for future work.

Dr. SOMERVILLE, in reply, said that he felt very grateful for the remarks and suggestions that had been made. No man with any sense would take exception to any criticism passed upon his work in this Society. Shortness of time prevented him from prolonging the experiments further than fifteen minutes after the current was cut off. As it was, each experiment occupied nearly an hour, and he took special

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pains to satisfy himself that the surface temperature had risen to a maximum level before any experiment was commenced. A quarter of an hour was usually spent in this preliminary work, a quarter of an hour in actual treatment, and another quarter of an hour—and in some cases beyond that time (*see* Group VI, fig. 7)—was spent in examination after the current had been switched off. He had not as yet had time to carry the matter further and to see how the temperature fell subsequently.

The persons experimented upon were called patients, but they were not "patients" in the proper sense of the word. He could not make these experiments on people who were ill; it would not have been wise. He might confess that he himself figured pretty largely in the experiments, and he also got his medical friends and relatives to come and be victimised. The patients were not diseased; they were, as a rule, normal, healthy people.

He did not know that the right hand carried more current than the left, but he did not quite see how to contrive an experiment to determine that point. Having tried with the right hand of the patient, one could not repeat the experiment immediately afterwards with the left. Tests gained in that way would not be satisfactory, and different times, of course, alter the conditions.

He had no explanation to give why the temperature should rise after the current is switched off. In the majority of cases it fell, and fell directly. He thought that the temperature was greater on the flexor surface because of the lymph channels, but perhaps, as had been suggested, thinness of the skin on the flexor surface might have even greater influence.

There was no difficulty in getting the thermometer in close contact with the body. It was attached to the limb with bandages or two elastic straps and absolute contact was obtained, while congestion was prevented.

It might be noticed in Groups X (fig. 9) and XIX (fig. 14), where the temperature was taken on the abdomen, that no constriction by the bandage was possible and therefore no congestion. The examination of the urine was a very important matter. In this respect the chief point about the action of high frequency currents is that if there has been previously a want of proper ratio between the urea and the uric acid excreted, the normal ratio (viz., one part uric acid to thirty-one or thirty-two parts of urea) is usually approached after high frequency treatment.

One reason why the pulse rate was not taken was that he wished to avoid interference during the temperature investigation. There is no hard-and-fast rule about the pulses. Under high frequency they are sometimes increased, sometimes decreased, and at other times they remain stationary.

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In old people the pulse generally falls a point or two; in young women it rises; in many cases it does not alter at all.

The Chairman asked a question about repeat experiments. The same person—the patient whose weight was given as 15 stone 7 lb.—was treated several times, and in all cases the temperature rose almost similarly.

Success in radiography can only be attained by those who are prepared to take an infinity of pains, and nothing but failure and discredit can come from slip-shod methods. How often one hears surgeons railing at radiographers.

What can be said of men who never have a plate ready for an unexpected case, or of those who are too slack or too inexpert to develop their own plates, and leave this important work to subordinates; what of those who allow days to elapse before informing the surgeon of their results or supplying the finished proof?

So, too, with difficult subjects and obscure radiographs. These should never be sent out without a personal visit from the radiographer who should patiently explain his interpretation of the appearances, and demonstrate his negative or his print in the clearest possible manner, marking them for right and left, front and back, and so on. A dark lantern with opal glass front is the best way by far of demonstrating an X-ray negative. It is much superior to a print, and is not complicated by the reversal of right and left which occurs in the latter.

Those who have learnt how to interpret bad skiagrams by years of study of inferior specimens, whether produced by themselves or by others, should bear in mind that a surgeon may be completely nonplussed when confronted with a bad skiagram, although it is quite intelli ible to the expert.

The photographic side of the work wants study, and little or nothing has yet been done in the direction of obtaining the best possible results by careful measured development.

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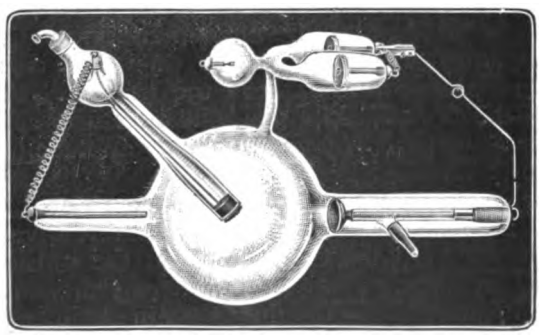

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MEDICAL
Electrology and Radiology.

No. 6. JUNE, 1906. Vol. VII.

DR. SABOURAUD'S ADDRESS ON THE X-RAY TREATMENT OF RINGWORM.

The account of the radiotherapeutics of ringworm given by Dr. Sabouraud at the Annual Meeting of the Dermatological Society, on May 23rd, contains many interesting details of his practice. For instance, he tells us that in extensive ringworm the whole scalp receives its exposures at a single sitting, the different areas being given their applications in succession, and being then covered by lead plates while treatment is applied to the remaining areas.

He says, in this way it is possible to make the ten or twelve exposures necessary to depilate the entire scalp without any time interval between them, and he adds, the patient runs not even the risk of a headache. He considers that idiosyncrasy may be neglected in X-ray work, and states that his two nurses have made 7,000 exposures since May, 1904, without coming across one instance of idiosyncrasy and without a single case of dermatitis, by relying upon the indications of the pastilles of platino-cyanide of barium. In this connection it is interesting to note that Messrs. Watson and Son have recently submitted to us a form of holder for the ready employment of these pastilles, because a contrivance of that description has been much wanted by operators in this country. We hope to report in a later issue upon the merits of this pastille holder.

Dr. Sabouraud insists that the proper position of the pastille is at 7·5 centimetres from the target, while the region irradiated should be at exactly double that distance, viz.,

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15 centimetres, and further that the pastille should be at least 2·5 centimetres from the glass wall of the tube, in order to avoid a misleading effect from the warmth of the glass. A small X-ray tube is therefore essential.

NOTICES.

The Annual Meeting of the American Röntgen Ray Society will be held at Niagara Falls, New York, U.S.A., on August 29th, 30th, and 31st,—a few days after the close of the Annual Meeting of the British Medical Association in Toronto, from which place Niagara Falls is easily reached.

The Executive Committee of the American Röntgen Ray Society hope that all medical men from this country, especially those interested in any branch of X-ray work, who propose going to Toronto, will so arrange their visit to Niagara as to enable them to be present at the whole or part of the proceedings.

Those doing so will be accorded all the privileges of temporary membership for the meeting, permitting them to participate in the debates and social functions, even though they may not be in a position to prepare and read papers there.

It will greatly facilitate the work of the organising committee if those who are likely to be present will, as soon as possible, communicate with Dr. R. Morton, 22, Queen Anne Street, Cavendish Square, W. He will forward their names to the proper quarter, in order that official invitations may be issued to them.

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ORTHO-DIAGRAPHY.

A METHOD OF MEASURING WITH ACCURACY THE OUTLINES OF THE HEART BY X-RAYS.

By PAUL C. FRANZE, M.D. (Bad Nauheim, Germany).

Ortho-diagraphy is the only method of obtaining with x-rays a parallel projection, and thus a shadow corresponding in size exactly to the object.

When a body illuminated by a source of light casts a shadow on a plane surface the shadow differs according as the light rays are divergent or parallel. In the first case we

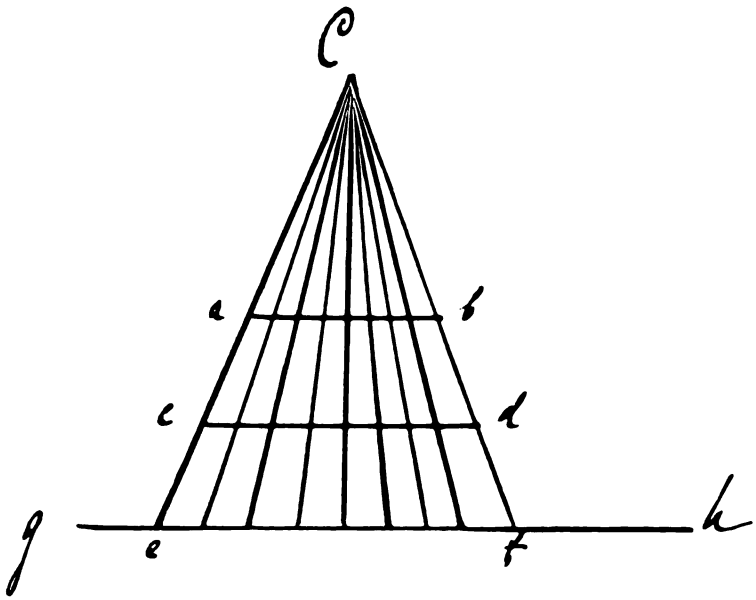

Fig. 1.—Central projection.

c. Centre of emission.
a b and *c d.* Diameters of objects.
e f. Diameter of their shadows.
g h. Plane of projection.

have a central projection (fig. 1), because the rays emanate from a centre of emission, and in the second case we have a parallel projection (fig. 2). The sun's rays alone give the latter, for they are practically parallel, by virtue of the extreme distance of the sun; but all terrestrial projections are central ones. For a true central projection the source of light should be a mathematical point. If the source is a luminous body or plane, it is a spurious central projection. In this case,

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each point of the luminous surface forms a separate centre of emission and throws a shadow of the object, and their contours do not exactly coincide, and thus are ill-defined.

The projection by Röntgen rays is practically a true central one, as the rays emanate approximately from the centre of the anti-cathode of the tube and are divergent. In a parallel projection, shadow and object are of equal size, but in a central projection, and therefore in the case of x-rays too, the shadow is larger than the original object, the enlargement being the greater, the further away the object be situated from the plane of projection and *vice versâ* (*see* figs. 1 and 2).

In the case of ordinary radiographs the magnification is practically unimportant, for they usually deal with parts of

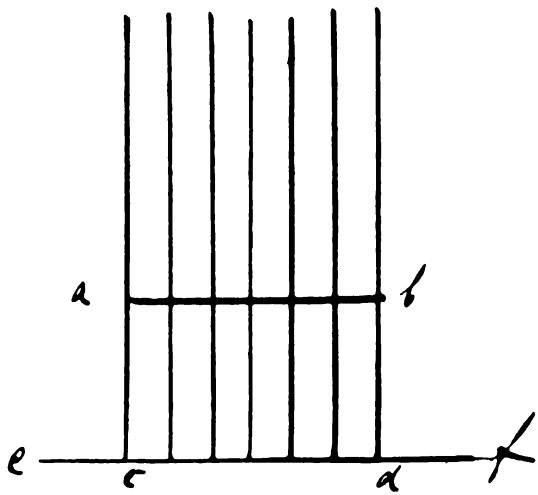

Fig. 2.—Parallel projection.

a b. Diameter of object.
c d. Diameter of shadow of object.
e f. Plane of projection.

the skeleton, or with foreign bodies or calculi, in which a slight magnification does not interfere with the diagnostic value of the picture, and, moreover, these parts can generally be brought so near to the photographic plate, which is the plane of projection in this case, that the enlargement is very slight.

With the heart, however, the case is different, for radiological examinations of the heart are undertaken mainly in order to ascertain its exact outlines, and as its greatest circumference lies about 7 to 10 centimetres away from the surface of the chest, a considerable enlargement of its shadow is present in an ordinary radiograph. It is therefore easy to

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understand that the need was soon felt of some means of obtaining the accurate size of the cardiac area by x-rays.

I do not propose to consider the different methods suggested for this purpose before the invention of ortho-diagraphy, but will proceed forthwith to a description of this latter. First, however, we may consider what parts of the cardiac area are capable of measurement by x-rays.

The superior limit of the cardiac shadow on the screen shades off into that of the aorta, pulmonary arteries, and vena cava superior, as does its inferior border into the shadow of the diaphragm. We therefore can only recognise the right and left borders of the heart, and must confine our measurements to certain points of interest on these. The principal points are those two, which correspond respectively with the greatest distance of the right and left borders of the cardiac shadow from the median line of the chest. The distance between these two points is termed the *transversal dimension* of the heart.

Ortho-diagraphy is based upon the following principles: of all the rays emanating from the centre of the anti-cathode of a vacuum tube there is *one* beam which is perpendicular to the plane of projection, say the screen. If it were possible to select this one ray and to conduct it around the circumference of the heart, and if it were also possible to mark at any given moment the shadow projected by this ray alone, then it is clear that we should so obtain a parallel projection in continuity, and an accurate reproduction of the size of the organ. For, if a perpendicular is moved along a plane surface it remains parallel to itself. These postulates are truly realised by ortho-diagraphy, invented and chiefly developed by Prof. Moritz.

Let us first examine the theory of the method more closely (*see* fig. 3). Let us now suppose the tube to be movable and the anti-cathode to be situated at *a*, so that the perpendicular ray *d* strikes the left border of the object *e t* at *e*; it will project the shadow of this spot to *g* on the screen, and all we require is to mark this point. Then, if the anti-cathode be moved over to *a'*, the perpendicular ray *d* falls on the other end of the object at *t* and projects the shadow of this point at *h*; we mark this place too. It is now obvious that the diameter of the picture *g h* is equal to that of the object *e t*. The same tracing can be carried out along the entire circumference of the object, and thus the outlines of the object are faithfully reproduced in normal size.

For this statement to be absolutely correct the plane of the organ's greatest circumference and the plane upon which the shadow is marked should be parallel to each other; otherwise the tracing will be somewhat smaller than the original, and the more so the greater the deviation from paral-

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lelism of the two planes. This is indicated by the line *i k* in fig. 3, which is longer than its shadow *g h*. In ortho-diagraphy of the heart this source of error plays a part as we have no means of determining the plane in which the greatest circumference of that organ is situated in each individual case, and therefore we are not in a position to adjust our screen exactly parallel to it.

In a normal heart, or in a case of dilatation of its right side, practically no source of error is caused by this circumstance, but where the left side is much dilated the greatest diameter of the organ assumes a position which is not parellel to the frontal plane of the body, and in such cases therefore the ortho-diagram is somewhat too small. But in

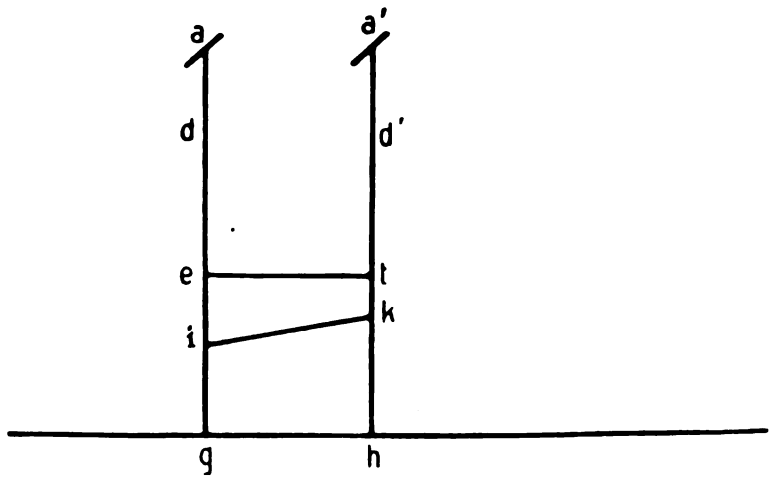

Fig. 3.—Explaining the theory of ortho-diagraphy.

spite of this source of error ortho-diagraphy yet remains the most accurate method of measuring the cardiac outlines.

The following are the principles which govern the construction of an apparatus of the kind required for carrying out these measurements: three metal bars are joined so as to form an open rectangle or "U," and their relative positions are adjustable. The rear one carries the focus tube at its free end, and the front one carries a pencil in the corresponding position, so that it is fixed exactly opposite to the centre of the anti-cathode of the tube, the perpendicular ray from which, therefore, falls upon the point of the pencil. The third bar connects the front and rear ones, and constitutes an axis around which front and rear bars are movable in planes parallel to each other and vertical to the perpendicular ray.

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In addition, the whole apparatus can be moved upwards, downwards, and to the right and left, the front and rear bars always remaining in the planes described, and without changing the relative positions of the tube and the pencil. The whole is fixed to a firm stand, and a system of levers and weights maintains it in a condition of approximately indifferent equilibrium. The front bar holds an x-ray screen, through the centre of which the point of the pencil projects; the patient is placed between rear and front bars, *i.e.*, between the tube and the pencil, with his back towards the tube. In working, the shadow of the heart is seen on the screen, and its outlines are marked by the pencil point which is followed in its movements by the x-ray tube, and thus one secures the projection of the image of the part examined by the perpendicular ray of the tube. The drawing may be traced either on the chest of the patient or on a sheet of paper.

Further points of interest regarding the technique of the method are the following :* It is considered to be desirable to make the tracing during the middle phase of respiration, and to follow the contours of the heart in diastole ; but in cases in which special difficulty attends such a proceeding, as for instance in irregular and rapid cardiac action, this need not be insisted upon, as the difference between the planimetrical expansion of the heart in diastole and in systole, under those conditions, is but slight and as the diastole lasts longer than the systole, and we, therefore, probably mark it involuntarily.

The marking should not be done by drawing a continuous line around the circumference of the shadow, but single dots should be made along its outlines, for it is scarcely possible to draw a continuous line all round the shadow accurately in all parts, and an error is likely to occur just at a spot of special importance. By making an interrupted line in single dots it is easy to pay special attention to the marking of the most important points. Moreover, the ramifications of the bronchi and blood vessels entering the hilus of the lung throw a lighter shadow, as it were, surrounding the denser one of the heart; we may call the former the "by-shadow" of the heart, and between this by-shadow and the heart shadow proper there is a narrow, more transparent zone, which facilitates the differentiation of the cardiac outlines, and this narrow lighter zone is often better seen when the tube is outside of it than when it is directly behind it. Thus, by travelling with the tube and pencil *from* the translucent field of the lung *towards*

* For the rest of this article I am relying on Prof. Moritz's works as enumerated at the end, except where I expressly quote the works of others, or my own observations.

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the deep shadow of the heart we can most easily define its contours.

Albers-Schönberg lays stress on the importance of having the ortho-diagraph always standing ready for use, because to adjust it for each individual case entails a considerable waste of time, and would probably lead to lessening the frequency of applying it. A tube of medium hardness is best for most cases, and it should be so constructed as to be able to bear a considerable current for several minutes, *i.e.*, its anti-cathode must be well backed with metal or water cooled. An electrolytic break worked from the mains affords the most brilliant transillumination ; accumulators and a platinum break are less efficient in this respect.

The apparatus is fitted with the tube, the latter appropriately adjusted in relation to the pencil, according to the principles set forth above, and is kept ready for immediate use in this condition.

Moreover, the screen should be covered with a sheet of lead glass for the protection of the operator, and his hands should be shielded by metal plates attached to the screen.

It is most important to accustom the eye to the dark before beginning to work, as this facilitates the distinction of shadow differences.

So far we have dealt with the theory and technique of ortho-diagraphy ; we can now consider some anatomical points and a few special technical questions, and the clinical aspects of its application.

It may be asked whether the thinner marginal parts of the heart are capable of throwing a sufficiently distinct shadow, or whether they are not transradiated in such a way as to be invisible on the screen. If this were the case the ortho-diagram would not present the true outlines of the organ ; but Moritz, who has investigated this question by experiments in the *post-mortem* room and on hearts injected with water, has proved that the outermost parts of the heart do give a distinct shadow.

Secondly, we require to know what anatomical structures of the mediastinum are concerned in forming the margins of the so-called " median shadow " of the thorax. The following remarks will make this clear : in transilluminating the chest of a person from back to front, one sees on the screen on both sides the transparent areas of the lungs divided in their entire height from above downwards by a vertical shadow meeting that of the diaphragm below. This is the " median shadow," and is constituted by the following structures : (1) the vertebral column ; (2) the sternum, which only makes a faint shadow ; (3) the heart and the great vessels, whose shadow extends laterally beyond that of the spine. The borders of the median shadow are therefore made up from above down-

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wards on the right side by the spine, the vena cava superior, and, succeeding this at an obtuse angle, the right auricle which joins the diaphragmatic shadow. On the left side the borders are made by the spine by a small curved, outwardly convex line due to the aortic arch and the first part of the descending aorta, and by another similar convexity formed by the left pulmonary artery and part of the right ventricle (sometimes too by part of the left auricular appendix), and lastly by a larger convex line formed by the left ventricle, which below joins the shadow of the diaphragm. In great dilatation of the right ventricle this part of the heart may form the last-mentioned line, the left ventricle being pushed backwards.

The measurements to be carried out in an ortho-diagram (*see* fig. 4) are as follows: having performed the tracing in the manner already described we draw upon it the middle line of the body, and on this we erect two perpendiculars, one from the point of greatest distance from it on each border of the ortho-diagram: *a c* and *b e*. These are called the right (*a c*) and left (*b e*) "median distance," the total of both being the "transverse dimension" of the heart. Further, a line *d f* from the apex to the spot where the straight border of the vena cava superior meets the convex outline of the right auricle may be termed the "longitudinal diameter" of the organ. We now add two perpendiculars *h o* and *g p* to this latter line, one from the junction of the border of the right auricle with the diaphragm *i*, or more accurately from the right inferior "angle" *h* of the heart, *i.e.*, the point where its right margin meets its inferior one, which latter line is not represented in the ortho-diagram and therefore is assumed, and one from the junction of the second and third left convexities *g*; the total of both these perpendiculars we call the "latitudinal diameter." According to Moritz this diameter is equivalent to the breadth of the right ventricle, whilst the other lines do not correspond to anatomical parts. Albers-Schönberg, however, believes that the lines described above correspond approximately to the following parts of the heart: the left median distance to the diameter of the left ventricle, the right median distance to that of the right auricle, the longitudinal diameter to the entire length of the heart, and the latitudinal diameter as already stated.

A further line *k l* may be drawn horizontally through the figure, and the angle which it forms with the longitudinal diameter may be measured; this, then, would be termed "the angle of inclination" of the heart, and it would help to define its position, being larger in a more vertical position of the organ, and smaller when the latter lies more horizontally.

Further, it is of importance to refer the figure to certain anatomical points in the body. Several methods of doing this

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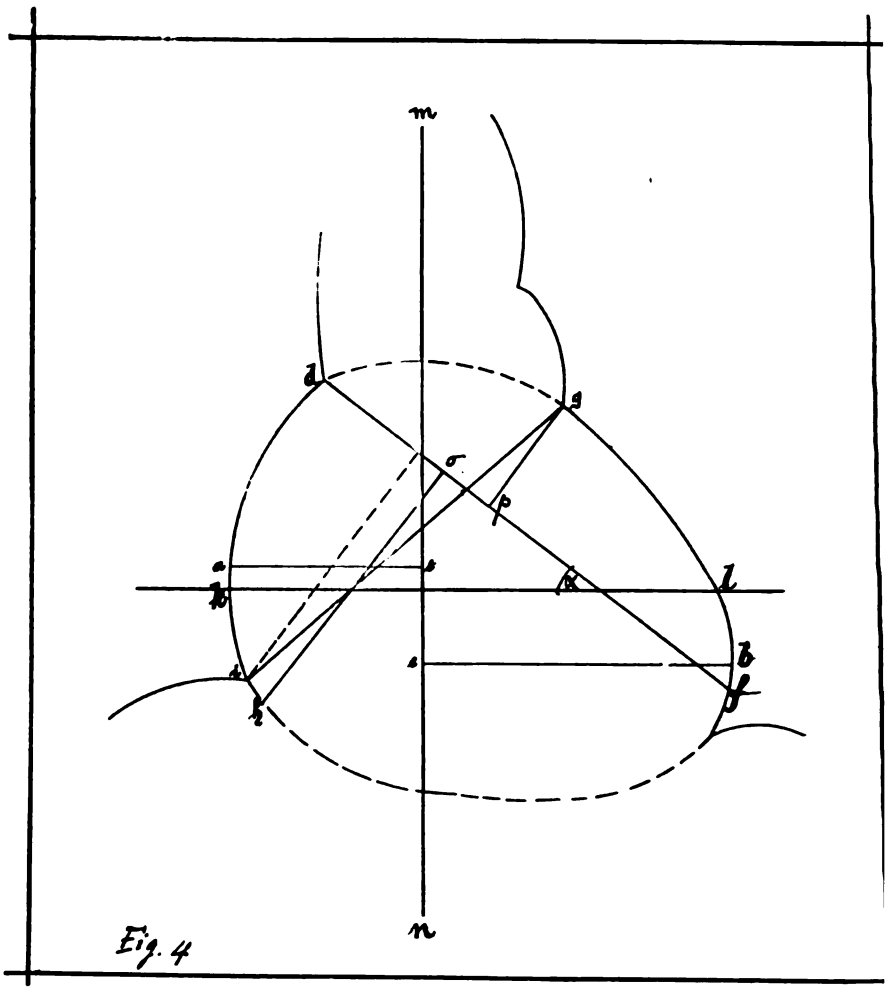
have been described; the simplest way would be the following: before taking the diagram, the median line of the chest and the inferior aperture of the thorax are marked out with a black dermographic pencil on the chest. If the diagram of the heart is not to be traced directly on the



Measurement of an ortho-diagram.

skin, then the ortho-diagram could be drawn on a sheet of ground glass through which the lines made on the patient's thorax are visible, and, after finishing the ortho-diagram, and before moving the patient out of his position, the lines on the chest are drawn in the diagram. However, there is a draw-

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back in using glass, as it keeps off the rays to some extent, and I am therefore trying to find some other transparent substance. If, however, the figure has been drawn directly upon the skin, then it must be copied, and this is best accomplished by holding a sheet of ground glass before the chest and marking the figure on the glass; from this it can be transferred by means of tissue paper, if necessary. In transferring the diagram from the skin to the glass care must be taken not to displace the skin in the slightest degree through pressure, and further to do the copying in the same position of the body and at the same phaseof respiration as that in which the original diagram has been taken.

A question of importance is whether an erect or a recumbent position of the patient is the best adapted for taking an ortho-diagram of the heart, as the diagrams of both positions differ in several respects. For answering this question, it seems to me to conduce best to a clear understanding if I divide the points bearing upon it into two groups. The first of these includes factors relating to the technique of ortho-diagraphy; in the second, we shall then advert to anatomical and physiological points of interest.

Technically, it is necessary to fix the patient efficiently, as movements may occur either upwards and downwards, or laterally, or thirdly by a turning of the body around its vertical axis.

The first can only occur in the erect posture, for instance, if the patient were to bend his knees; but as this can be obviated by the will this source of error may be excluded in dealing with adults; in children, however, it is important, and in them it is sufficient to exclude ortho-diagraphy except in the recumbent position. Lateral movements are an important source of error if one projects the figure on a plane independent from the body, but not if the tracing is taken upon the patient's own chest, for then slight lateral movements are unimportant, because the drawing moves with the body, and thus the relations of the various points of the diagram to each other are not altered. Turning, however, around the vertical axis of the body must in every case be carefully avoided.

The best fixation, undoubtedly, is attained in the recumbent posture, if, as advised by Moritz, a canvas-typed couch is used. All movements are easily excluded in this way, but the lungs are not as transparant as they are in the erect position, and the margins of the heart shadow are therefore less distinctly discernible. Moreover, the heart is in contact with the diaphragm along a longer base, its apex is buried in the shadow of the latter, and, though it remains visible, it is seen with more difficulty.

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Therefore, technically, the advantage of the recumbent position lies in the better fixation of the patient, and its disadvantage lies in the greater difficulty of distinguishing the outlines of the cardiac shadow.

If the standing position is adopted special methods of fixing the patient must be employed. This can be achieved by letting him lean against a frame covered with canvas with blocks to support the shoulders. All movements can be prevented in this way.

In the upright position the lungs are more translucent, the borders of the heart more distinct.

Technically, therefore, the advantage of the erect posture is represented by the fact just stated; its disadvantage would be the less thorough fixation; but, as we have seen, this can easily be obviated.

We may, therefore, conclude that from a technical standpoint there are no objections to using the upright position for ortho-diagraphy.

If we examine the point from its anatomico-physiological aspect we find that if an ortho-diagram of the heart of the same person be taken first in the upright and then in the recumbent position the following differences in the two diagrams will be noticed (fig. 5):

I.—*In standing:*

1. Frequently the longitudinal axis of the heart is more upright, the angle of inclination therefore greater.

2. Generally one or both median distances, and thus the transverse dimension, are shorter than in lying, the difference being from 0·4 to 2·5 centimetres.

3. In the majority of cases the latitudinal dimension is shorter too.

4. The longitudinal diameter is sometimes shorter and sometimes longer.

5. The heart is constantly found at a lower level of the thorax than in the horizontal posture.

Thus the cardiac diagram is narrower in the erect position.

II.—*In lying* the conditions are the reverse of those mentioned. The causes for a diminution of the cardiac shadow in the upright position are probably the following:

1. The more vertical position of the heart itself in standing causes a diminution of the transverse diameter.

2. The heart may rotate around a perpendicular axis defined by the aorta above and the vena cava inferior below, in

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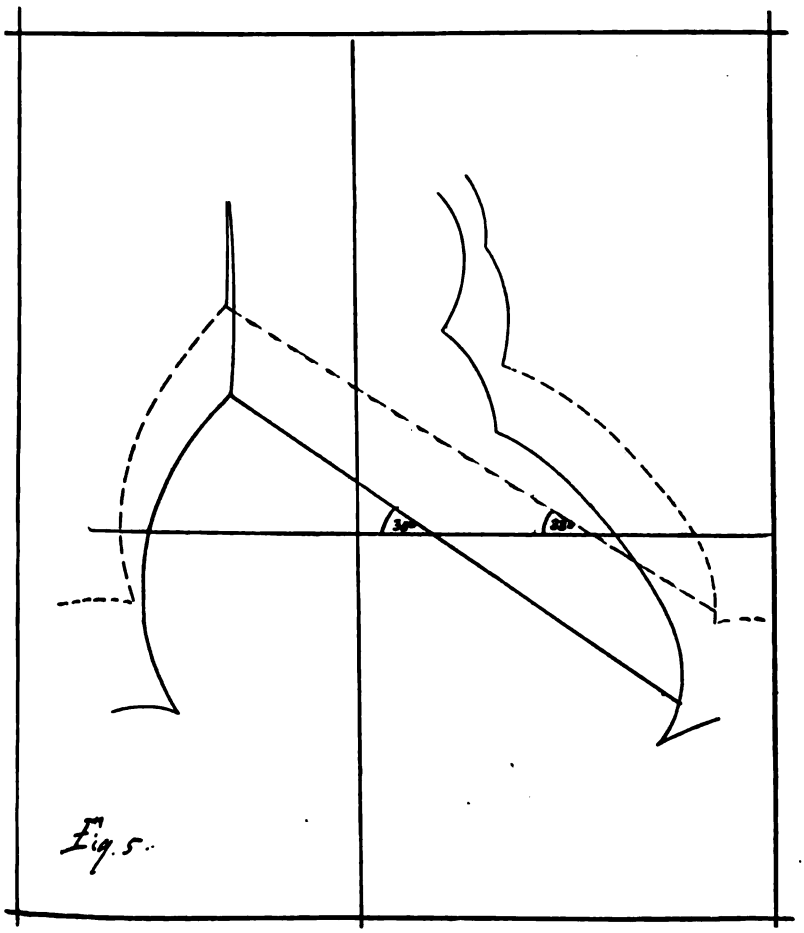
such a manner as to present a smaller section in the frontal axis of the body.

3. The *actual* volume of the heart may decrease in standing, or



Ortho-diagrams of the same heart in the erect ———, and in the recumbent ------ posture.

4. Several of these reasons may unite to bring about the result.

No. 1 is certain; it causes shortening of the transverse dimension alone, and therefore is inadequate to explain the whole of the diminution in size; moreover, it is not the only

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reason for a decrease of the transverse dimension, because this can take place without any change in the angle of inclination.

No. 2 would suffice to explain the entire diminution of the cardiac area in the erect posture; but Moritz believes that he has been able to prove by careful experiments that such a rotation of the heart around an imaginary perpendicular axis cannot occur.

No. 3 is regarded by him as the true cause. In ortho-diagrams of the heart taken at right angles to the ordinary direction, *i.e.*, from the right to the left side, he found a similar difference in size between the erect and the recumbent position, the former again giving a smaller diagram. This, of course, is conclusive evidence that the heart is actually somewhat smaller when a person is standing than when he is lying horizontally. And on this ground Moritz prefers the horizontal position for ortho-diagraphy.

It may be of interest to recapitulate the general conditions normally governing the size of the heart. These are a person's height, his age, and the general muscular development. In women the size of the heart corresponds to that of men of equal height, only the right median distance is frequently recorded as being about 1 centimetre less than in equally tall men.

The first table (I) shows the mean figures for normal hearts found by Moritz in horizontal ortho-diagraphy. (Taken from Albers-Schönberg: *Lehrbuch der Röntgen technik.*)

TABLE I.

Height of Person		Right median distance (cms.)	Left median distance (cms.)	Longitudinal diameter (cms.)	Latitudinal diameter (cms.)
153—157 cms.	Average ...	4·4	7·9	13·0	10·2
	Maximum...	4·8	8·0	13·5	10·5
	Minimum ...	4·0	7·8	11·5	10·0
161—169 cms.	Average ...	4·4	8·3	13·4	10·5
	Maximum...	5·0	9·3	14·5	10·8
	Minimum ...	3·5	7·5	12·8	9·0
171—178 cms.	Average ...	4·6	8·8	14·0	10·3
	Maximum...	5·9	9·7	15·3	11·0
	Minimum ...	3·0	7·8	12·5	9·0

The following table (II) contains the figures which I found in nine comparative measurements between the erect and horizontal posture, all being in men suffering from heart affections.

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TABLE II.*

Age.	Clinical Diagnosis.	M. D. r. cms.	M. D. l. cms.	Tr. D. cms.	Lat. D. cms.	Long. D. cms.	Angle of Incl.	Posture.
36	Dilatation of heart	5·0	11·0	16·0	14·0	16·0	47°	erect
		6·0	12·0	18·0	15·5	17·0	40°	recumbent
25	Chronic nephritis; dilatation and hypertrophy of heart; systolic bruit	6·0	10·0	16·0	12·5	16·5	30°	erect
		7·0	10·5	17·5	14·0	17·0	25°	recumbent
37	Neurosis of heart and general neurasthenia	3·8	9·0	12·8	12·0	12·5	35°	erect
		5·6	7·0	12·6	11·0	14·0	37°	recumbent
57	Myocarditis.....	3·6	9·0	12·6	12·0	15·0	42°	erect
		4·0	9·8	13·8	12·0	16·0	44°	recumbent
23	Mitral insufficiency	6·0	8·8	14·8	11·5	14·5	32°	erect
		6·5	9·5	16·0	11·7	15·0	35°	recumbent
20	,, ,, (?)	5·0	8·3	13·3	10·5	14·0	42°	erect
		5·5	8·4	13·9	11·0	15·0	39°	recumbent
18	,, ,,	5·0	6·5	11·5	10·0	12·0	32°	erect
		5·0	6·5	11·5	10·0	12·0	32°	recumbent
27	Dextero-cardia, Pulmon. phthisis...	10·5	3·0	13·5	10·5	14·0	48°	erect
		11·0	3·5	14·5	11·0	15·0	45°	recumbent
27	Dilatation of heart	5·2	8·5	13·7	12·0	13·5	39°	erect
		6·0	9·4	15·4	12·9	14·5	36°	recumbent

* Explanation of abbreviations:—

M. D., r. = Median distance, right.
M. D., l. = ,, ,, left.
Tr. D. = Transverse Dimension.
Lat. D. = Latitudinal Dimension.
Long. D. = Longitudinal Diameter.

If it be taken as granted that the size of the heart is somewhat smaller in the upright than in the recumbent position the further question arises: Does this circumstance alone justify the conclusion that ortho-diagraphic measurements should only be made in the last-mentioned position, or are there any other circumstances which should be taken into account before drawing such a conclusion? I believe there are, viz., there are no *absolute* figures of the normal size of the heart at all, as is shown by the above remarks and table I; therefore, in order to use the erect posture for ortho-diagraphy, all that is necessary would appear to be to compile out of a great number of measurements a table showing the approximative mean figures of the ortho-diagram for *this* position.

In regard to this most important question of posture in ortho-diagraphy I consequently arrive at the following conclusions:

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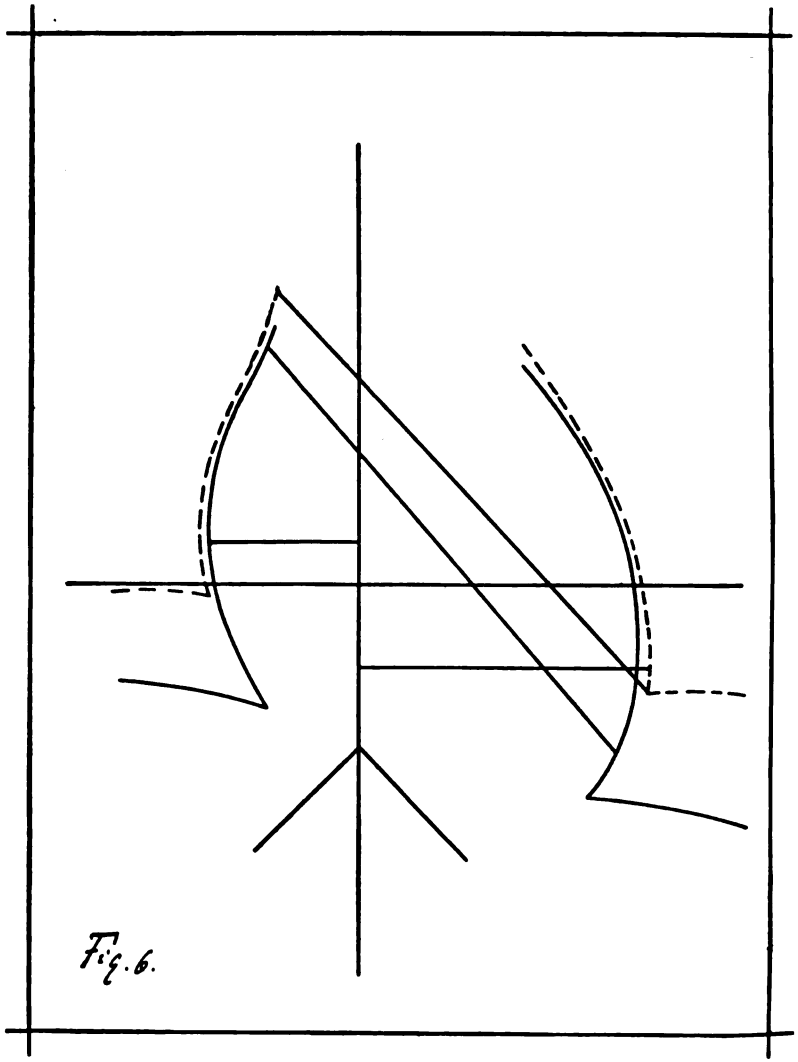
In anatomico-physiological respects, both the horizontal and the vertical position are equally good in themselves; it is only necessary always to use the same position for successive



Ortho-diagrams of the same heart in deep inspiration ——— , and in extreme expiration ------

measurements in the same person; but, technically, the upright position facilitates work in some degree.

The effect of *respiration* on the position and shape of the heart is similar to that of posture (fig. 6).

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Inspiration corresponds to the upright position; the heart moves downwards, it lies more erect (increase of angle of inclination), and it frequently becomes narrower in outline; sometimes it only descends without any change taking place in its measurements. Expiration corresponds to the recumbent position, bringing about the same changes as this latter.

No investigations have yet been published as to whether here too an actual difference in volume takes place. The lungs, of course, become much more translucent in deep inspiration than they are in expiration.

It is for these reasons that at the present time the opinion held by most experts is that the middle phase of respiration should be utilised for ortho-diagraphy. But as most patients breathe irregularly during examination I would for the present leave the question in suspense, whether it were not preferable always to take the ortho-diagram during deep inspiration, the breath being held. In a way this would certainly increase the accuracy of the drawing, and that seems important. The standard table of measurements would then have to be referred to this phase of respiration. Often in very corpulent individuals the shadow can only be seen distinctly in deep inspiration; with them, therefore, we have to use this phase in any case.

Our last question is, whether to draw the diagram on the skin of the chest or on some other surface. The former method has the advantage of permitting of direct inspection of the regional relations of the heart and of comparing the ortho-diagram with the results of percussion; it has the disadvantage of tending to slight inaccuracy in the process of transferring the figure to paper.

The most accurate method therefore is to project on a special plane as described above.

It should be mentioned that the diagram obtained by percussion is frequently somewhat different from that of ortho-diagraphy; in this case the former is larger, and this is to be explained by the circumstance that one does not percuss sagittally but perpendicularly upon the curved surface of the thorax; therefore, the difference is most marked at the left border of the heart. Further, the point at which the apex beat is felt may sometimes lie beyond the ortho-diagraphic outline; this is due to its being palpated so far beyond its actual place as the thickness of the thoracic wall amounts to.

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ODDS AND ENDS OF X-RAY WORK, INCLUDING SOME CASES OF CARBUNCLE.

By R. R. Coyle, M.B., G.M.

I had purposed reading a paper on the influence of X-rays on epithelial tissues, and this because of the power for good they place within reach of medical man. It is matter of common knowledge how by their use certain forms of skin disease, formerly the bane of our lives, have been deprived of their terrors. Of this particular class of case it was not my intention to speak, but rather of those conditions of malnutrition which tend to sterility. I have long been of opinion, and experience has tended to confirm me in that opinion, that in X-rays properly applied and with suitable precaution we have an agent capable of yielding results unattainable by any other within the ken of man. However, a note of alarm has been sounded, a certain number of gentlemen having discovered that spermatozoa were absent from their seminal fluid communicated the event to a doctor of eminence in New York, she has taken us into her confidence, panic has got hold, and he that desires to be a "father in Israel" guards posterity with an X-ray shield.

About four years ago I was asked to see W. R., aged 55. I found him suffering from carbuncle at the back of the neck, across the base it measured 3 inches. He was unable to move his head in any direction. Continued pain was wearing him down, his sleep was broken and unrestful, and his appetite was capricious and less than it should be. Now I had had a rather melancholy experience in several other cases of carbuncle, which, while they recovered, still were slow about it, and indeed hung in the balance for a considerable time. So, to expedite matters and to give my patient an easy and pleasant recovery I determined to call in a specialist, and accordingly my old chief, Dr. P., was asked to see him. He decided on the crucial incision line of treatment, and acted on his decision. Hot charcoal poultices were applied without intermission, and the old slow process of discharge began. His strength was maintained as far as possible with suitable diet, etc., but at the end of ten days the surgeon asked for a physician in consultation. Dr. M. was called in, this made up the number of doctors in attendance to three; in short, at the end of another fortnight the doctors agreed that he was practically well and advised a change to the coast next day. That afternoon he died, and the coast visit was off.

The outcome of this case gave me matter for thought for the next few weeks, and I was by no means anxious to drop across a similar one.

I had been using X-rays with satisfactory results in some cases where crops of boils had been troubling, and about

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three months after my patient's death a man came to me suffering from ischiorectal abscess. His own doctor had wanted him to lay up and poultice until it ripened, this he said he could not do as the pain was so severe; he could not rest, nor sit, nor walk with comfort, and as he was extremely nervous his case was distressing. I suggested incision at once, but at mention of it he nearly fainted, I therefore determined to see what the X-rays would do for him. I gave him an exposure of eight minutes with a medium soft tube, using a 12-inch coil, taking 1½ ampères through the primary at 250 volts. He experienced great relief at once, could walk with ease, sit in a one-sided way with comfort, and recline without any inconvenience whatever. That night the abscess discharged painlessly, and in four days the abscess had healed and he was at work. I now bethought myself of my old carbuncle case, and was of opinion that could I have got treating him over again I might have saved a funeral. However, I had a number of cases of boils and another ischiorectal abscess ere I had a chance of testing my idea.

On 12th November, J. L., aged 36, traveller, came to see me. He had a beautiful specimen of carbuncle at the back of his neck, close on 3 inches across the base; he had been ill with it for a fortnight and by this time could not eat, sleep, or do anything, other than think of his woes. His neck was rigid, he could neither turn nor straighten it. I protected his hair with a mask and gave him a ten minutes' exposure with a soft medium tube, using again a 12-inch coil, taking 1 ampère through the primary at 250 volts. At the end of that time I removed the mask and turned his head round to either side without causing him any inconvenience. I gave him other four treatments similar to the first, but he was practically a cured man from the first application, and he made a painless recovery while attending his business in a week. In this case I had looked for the carbuncle discharging much after the manner of the ischiorectal abscess, but to my amazement it disappeared as if it had never been, the skin unbroken and no trace left—"the place that had known it knew it no more." I need scarcely say how pleased I was at the outcome of this case, and like a certain individual I "wanted more." My second case came to me on the 22nd of February. R. S., aged 46 years, carbuncle on right hip, been in position for about three weeks, unable to sit, walk, or sleep. The same line of treatment was followed and with the same result: pain ceased at once, could walk with ease, and recline without being conscious of the tumour. This also passed as if it had never been, without discharge. He had four treatments in all, and entirely better in a week. Other two cases I have had and with like results.

Lastly, on the 26th of April, I was asked to see A. M., aged 45 years. I found on the right side of his neck a well-

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marked carbuncle 2½ inches across the base, with the usual accompaniments. It was my purpose to leave him untreated until Saturday night, when I could have shown him to one of our members who was coming to Glasgow. Feelings of humanity prevailed, the man was suffering a good deal of pain, and I did not feel justified in holding over the case. An eight minutes' exposure with a medium soft tube gave him instant relief, next day this was repeated, and on Monday he got his third and last treatment. I may say that on Saturday he was so much better, and the carbuncle so much shrunken (¾ inch), that I did not consider he was worth showing.

I would just like to add that at no time have I experienced any of the X-ray troubles about which I have read so much; there is nothing in this world so good or so benign, but if taken or given to excess will do harm. And after years of X-ray work I have nothing but good to say of it.

When a doctor has placed his patient in position there is seldom any need for his standing within the immediate X-ray field. And should he be careless the mealy condition of his skin would be a timely warning. Any tendency to eye irritation can be avoided by using lead glass spectacles. Most of the trouble with patients a little extra caution might smooth down.

I have only had one case of X-ray burning, and that I knew was coming. It was a periostitis of the tibia which I treated with X-rays. Ere I got the desired result the skin of the man's leg was destroyed. Now I had read somewhere that when a watch had been damaged by too close proximity to a dynamo it could in many cases be demagnetised by means of X-rays. So I thought that by reversing the process I might get help. I applied the brush discharge (high frequency) with as heavy a current as the machine would take, and whether it was that the method was the right one, or that there was not a great deal of damage done, the skin healed up in a very satisfactory manner for both patient and doctor.

Last winter I had rather an amusing experience. R. P., a Wesleyan minister from Leicester, was being X-rayed for goitre (exopthalmic). I had neglected to shield his face, with the result that his moustache, of which he was very fond (although it consisted of a few straggling bristles), came out and left him bare.

He was in great distress over it and would not be comforted, although I told him it would grow again. However, I sent him home for the Christmas holidays, and on his coming North again at the end of February he was sporting an upper lip covering of which any man might be proud. The hair was plentiful, soft, and well-fed looking, and trainable in any direction.

Quite a number of cases of pruritus ani have come my way, and at one time gave me considerable annoyance.

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Since I have added X-rays to my armamentarium they have ceased from troubling.

My last case occurred in January of this year, when a gentleman came to me in great distress. He had to give the speech of the evening at one of our big Burns' suppers, he was suffering from an imperative pruritus ani. As he explained to me, it would be rather awkward for him to be laying it off about the Immortal Bard with only one hand. One exposure of the X-ray for ten minutes showed him that he had two hands available for his oration.

The work that I have been describing has been done by means of various apparatus, mostly by means of 12-inch coils, but in one of them a 20-inch coil was used, and in another a ten-plate 21-inch static machine made to my order by Messrs. Baird & Tatlock, Glasgow. It is an ideal machine where a good supply from public mains is not available, is easily kept in order, will work in all sorts of weather, and is very durable. For all my cases I now use the Grisson apparatus only. It is the most flexible machine imaginable, yielding at a touch of the finger hundreds of variations of current volume; it shortens the day's work and does it better, gives a unidirectional current, needs no adjusting, and is always ready for work.

A word about coils. Would it not be possible to standardise all coils supplied to members of our Society and their friends, *i.e.*, to have them tested on a certain ampèrage and voltage, so that a given milliampèrage in the secondary would be available. Such coils bearing the stamps of the Society could be used with confidence and should go far to establish uniformity in results gained. The makers could be charged a small fee to defray expense of testing. Something like this should be done, it is not fair that we should have to take anything they choose to give us. This work could be undertaken by a small committee, and it might be made part of their province to recommend the kind of X-ray tube suitable for the various conditions to be treated. In the many kinds and forms of tubes in the market it might be pardoned even an old hand the making of mistakes, there are so many cheap and nasty, and so many nasty without even being cheap. For a considerable time I have confined myself to using only those with fairly thick glass, always with anticathode mounted on iron tubing. They do not readily become heated, and their vacuum is more steady, they are bianodal with osmosis regeneration.

It might also be made a part of the work of the committee to compile from the experiences of the members a Manual of Electrotherapeutics, so that a beginner might have something to go by. The older members each contributing their individual brick to the Temple of Knowledge.

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FIRST ITALIAN CONGRESS OF PHYSICAL THERAPEUTICS.

The First National Congress of Physical Therapeutics was held in the Policlinico of Rome, on the 25th, 26th, and 27th of May, under the presidency of the Honourable Professor GUIDO BACCELLI (Professor CARLO COLOMBO, Secretary). At the first sitting a National Italian Association of Physical Therapeutics was constituted.

Dr. G. L. SCARPA, of Turin, spoke of the professional relations which should exist between those in charge of physiotherapeutic institutes and of hydropathic and thermo-mineral establishments, and other medical men engaged in practice.

Dr. L. COLESCHI referred to the obligation of those practitioners who take up hydrology, balneotherapy, and other branches of physical therapeutics, to attend special courses of instruction in physical therapeutics, and Dr. NEGRO, of Turin, described the actual conditions of teaching physical therapeutics in the universities, and of the necessity of elevating it to an official position.

Dr. NEGRO and Dr. COLESCHI then proposed a resolution, which was approved, to the effect that the teaching of physical therapeutics should be granted an official recognition, as this would compel those medical officers, who intended to practise in the various branches of physical therapeutics, to attend special courses in these subjects.

Dr. GRAMEGNA, of Turin, described a new radiometer which was superior in many respects to the ordinary means of measuring the number of rays, and was especially useful for the instantaneous measurement of the energy given out by a tube; Dr. Gramegna also, on behalf of Professor Pescarolo, reported the results obtained by radiotherapy in the treatment of cases of syringomyelia and in two cases of tumour of the spinal cord, with complete success in the first instance, but with little result in the second case.

Drs. PASCAROLO and QUADRONE communicated an interesting statistical account of their radiotherapeutic work, illustrating it with many interesting comments.

Dr. QUADRONE, of Turin, described his researches on the elimination of uric and phosphoric acids in the urine of patients suffering from leukæmia and allied maladies during and after the radiotherapeutic treatment, and gave his conclusions.

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Dr. ESPIGHI made some observations on the radiotherapy of eczema, and described his method of procedure.

Dr. RANDO presented a modified radiochromometer of Benoist, devised by Professor Coutini, of Messina.

Dr. BERTOLOTTI described the examination of the cerebrospinal fluid in the course of some radiotherapeutic applications, and concluded by saying that there was evidence of a direct influence of X-rays upon the nerve centres and the meninges.

Dr. TESSARO gave a statistical report of the radiotherapeutic work done in the Physiotherapeutic Institute of Padua, and showed X-ray photographs of a renal stone, taken with the aid of a compressor designed by himself.

Dr. RANDO, of Messina, showed a case of cancer, cured in thirty sittings.

Dr. BERTOLOTTI discussed the radiotherapeutics of the internal organs and of the importance of a correct technique, and expressed a preference for the static machine as a source of current for the X-ray tube.

Dr. N. CARPI described two cases of leukæmia treated by Röntgen rays, and thought that the best results were obtained from the simple radiation of the splenic region.

Dr. VIGANO supplemented Dr. Carpi's remarks by giving details of the process adopted by him in the treatment of leukæmia by X-rays.

Dr. FONTANA related four cases of curious metallic bodies extracted by forceps from the œsophagus with the aid of X-rays.

Prof. C. COLOMBO, of Rome, mentioned the errors of the dosimetric indications given by platino-cyanide of barium, and showed experiments to illustrate the fact that the brownish colour, which the Sabouraud-Noiré pastilles assume under the action of the X-rays is partly due to heat rays.

Dr. ESDRA presented a case of endothelioma of the skin, successfully cured by radium.

Dr. TOMMASO LUCREZIO described two cases of ozœna, treated by him with high frequency currents. He exposed the technique and the results which he had obtained, and strongly advised that this method be adopted in all cases of ozœna.

Dr. GAVAZZENI reported a case of auditory vertigo cured by the galvanic current.

Dr. GATTONE VINCENZE described two cases of lupus and eight of anthrax (postolo maligno) cured by freezing with ether or ethyl chloride, and advocated this method as

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conservative, easy of application, agreeable to the patient, and not painful. It was better than the use of caustics and had as high a value in lupus as the light treatment.

Dr. CARBONE AGOSTINO, of Turin, presented an electric apparatus for vibrational ocular massage combined with electric currents. It was inexpensive and easily applied.

Drs. L. G. SCARPA, of Turin, SIGALIN, of Varsovia, GIGLIO, of Palermo, showed apparatus used in spirometry and atmotherapy.

Dr. GAVAZZENI, of Bergamo, described the good results he had had in trigeminal neuralgia from the use of direct currents.

Prof. CODIVILLA, of Bologna, showed photographs of an apparatus for the treatment of scoliosis in the cervical region. It is made to perform movements of oscillation and rotation of the head in the position necessary to correct the deformity.

C. COLOMBO.

Treatment of Exophthalmic Goitre by Röntgen Rays.—R. Stegman refers to three cases of Basedow's disease of many years' duration, which he had successfully treated by exposure to the Röntgen rays. The fears of the reporter at the outset that the breaking down of the gland substance and its absorption might produce hyperthyreoidism were groundless. In his experience with thirty-five goitrous patients also subjected to this method, and who were carefully observed during a rather long course of treatment, there was not at any time any evidence of poisoning of this kind. The author adds the details of a third case of Basedow's disease to the two already reported, one of which he had presented at a session of the society of physicians in Berlin. Upon the results of his treatment in these three successful cases, he concludes that it is beyond question that a very favourable influence and cure of Basedow's disease is possible through radiation of the altered thyreoid gland. Adopting the theory of Möbius as an explanation of the action of the rays, then we have its simple demonstration in the fact that through the radiation of the pathological organ, a lesion of the glandular epithelium takes place, which, in every case, produces a quantitative and qualitative alteration of the secretion. Widerman (*La Tribune médicale*, January 27th, 1906) has also treated five cases of typical Basedow's disease by radiation applied to the enlarged thyreoid, with the results that the nervous symptoms were materially ameliorated in two cases, and the general health was improved in all and the bodily weight was notably increased. But no improvement was noticed by this reporter, either in the exophthalmus or in the tachycardia.—*New York Medical Journal*, March 10th, 1906.

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Thirty-seventh Ordinary Meeting of the Society was held on Friday, May 25th, 1906, at 11, Chandos Street, W. The President (Mr. J. HALL-EDWARDS) in the Chair.

Present: Twenty-seven members and visitors.

The minutes of the previous Meeting were read and confirmed, and the following candidates nominated for election at the next meeting: Charles Thurstan Holland, M.R.C.S., L.R.C.P.; Percival Fenwick, New Zealand; Percy Lambert, M.R.C.S., L.R.C.P.; J. Ellington Jones, L.S.A.; Robert Bishop, M.B.

Dr. R. R. COYLE, M.B. (of Glasgow), then read his paper on "The Treatment of Carbuncle by X-rays." In closing, he suggested that, perhaps, a small committee might be appointed by the Society to test and stamp the coils that were found to give the best satisfaction. A kind of standard coil with a given voltage and milliampèrage might thus be determined upon. The committee could also recommend to beginners the most suitable tube to use. There were many tubes on the market, some of them cheap and nasty, others nasty without being cheap. In fact, it would be a part of the work of such a committee to compile from the experiences of older members a manual of electrotherapeutic apparatus.

The PRESIDENT, after thanking Dr. Coyle for his paper on "The Treatment of Carbuncle," said: The results of the treatment seemed to have been exceedingly good. He had had very little experience of the treatment of carbuncle in his own practice, and therefore could say but little about this particular application of the X-rays. But it seemed probable, judging by the action of X-rays in other ways, that the treatment should be an excellent one.

Dr. ALLAN (of Glasgow) said that he had had particulars of this treatment of carbuncle from Dr. Coyle, and had put it to the test. In two cases—both very distinct cases of carbuncle—treated after Dr. Coyle's method, excellent results had followed. In no other method, of which he was aware, did the carbuncle disappear in so short a time.

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Dr. LEWIS JONES referred to the question of the standardisation of apparatus by the Society. He thought that, perhaps, the Society could usefully do something along that line, but he foresaw certain difficulties in carrying out the undertaking. It must be borne in mind that a coil suitable for X-ray work might be unsuitable for high frequency, and the same difference applied to interrupters.

With regard to tubes, there seemed to be a tendency at present to revert to the simple form of the French Chabaud tube with osmoregulator. For his own part he did not like complicated tubes, and he noticed that Professor Bergonie had recently stated that the forms with side tubes (self-regulating) seemed to be going out of fashion. Personally he preferred the Chabaud tube but did not know whether the members of the proposed committee would all agree with him, and he thought that at present it would be difficult to recommend any single make or size of X-ray coil to the exclusion of others. He thoroughly endorsed the principle that the Society should undertake some attempt at standardising electro-medical apparatus. There were some instruments which could be dealt with now, but there were others for which it would be best to wait a little longer.

Mr. STANLEY GREEN: Personally, I had listened to Dr. Coyle's paper, not only with interest, but with some degree of astonishment. It seemed an extraordinary thing that a carbuncle, which had existed for three weeks, and with a base 3 inches across, should be resolved without breach of surface when treated with X-rays. A carbuncle generally contained a hard, yellow slough, and he could only say that the X-ray treatment must have acted like magic to have made it disappear so rapidly and quietly. Although he was an enthusiast in the matter of X-rays, and willing to submit to such treatment anything that seemed to stand even the smallest chance of benefiting by them, he considered the application a little bit dangerous in cases such as two of the patients mentioned in Dr. Coyle's paper, and he certainly thought that the best plan under such circumstances would be to have the carbuncle removed by surgical means. He did not wish to depreciate the value of this treatment in cases of carbuncle, but thought they might fairly ask for a few more details as to the condition of the patient, his temperature, the state of his tongue, etc., and also as to the appearance of the carbuncle itself. Some carbuncles remain merely flattened indurations of the skin, and will not slough; others, however, stand up from the skin, and in the latter cases he should certainly prefer the old method of treatment, namely, to make a crucial incision and apply germicides in the ordinary way.

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He thoroughly agreed with Dr. Lewis Jones in his remarks about Chabaud tubes. He had used these tubes for two years. The only thing against them was their price. There was also the difficulty of getting a good Chabaud tube. His first one remained in continual use for six months; the next two were of little value, but now he had another good one which promised to last even longer than the first.

Dr. HORACE MANDERS, L.S.A.: He thought that anything which can prevent the method of crucial incision of treating carbuncle very much to be desired, for such an incision was a great drain upon a man's constitution; so great that very often—especially in the case of elderly people—the patient died, as in Dr. Coyle's first case. Whether the X-rays had any effect in destroying the streptococcus he did not know, but they appeared to render the virulence less, or the resistant power of the body greater.

Dr. Coyle mentioned that some 12-inch coils have a thin spark and others a fat one. This very often had to do with the capacity of the condenser.

Dr. COYLE, in reply to Mr. Stanley Green, had only to say that the patients had been suffering for the time stated before they came to him. His last case of carbuncle operated upon by crucial incision had resulted in death. He therefore thought it would be worth the experiment to try the X-rays on the next carbuncle that came to his notice, and the results had been everything that could be desired. He could not tell how the X-rays did the work, and could merely report the results, in which results Dr. Allan confirmed him. There was no one there who could not easily test the matter for himself, and then he might build up any theory he pleased of the *modus operandi* of the rays. The crucial incision was a terrible thing. The long, slow process of suppuration went on and the patient's vitality went continually down, and often the ultimate result was as it had been in his first case. Until the X-ray treatment failed him he would never think of trying anything else.

The PRESIDENT then brought forward a new form of Raymeter, which he ventured to think would help to overcome the difficulty of measuring the X-rays. So long ago as June, 1896, he had published in the columns of *Photography* a description of what he believed to be the first raymeter for measuring X-rays. It consisted of a series of layers of pen steel of chosen thickness, arranged in a number of superimposed square steps, each one-eighth of an inch broad. That arrangement was not quite satisfactory, because the number of steps was not sufficient to bring out all the differences, especially when the exposure was a short one, and he

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now used ferrotype plate arranged as shown. The raymeter in its present form had thicknesses varying from one to twelve, and he had had them made in order to carry on some experiments which, with their results, he hoped to bring before the Society later on.

He then showed several negatives taken of the raymeter with tubes of different penetration. He added that he always used a diaphragm compressor in cases of renal calculi, as it reduced the localising process almost to a certainty, and he felt quite safe now in accepting a negative result in a renal case if he got a photograph showing fairly clear detail of surrounding parts with the diaphragm compressor. This he never felt before, and claimed for his simple little instrument that it allowed of a much greater variation in exposure than was possible with the Benoist instrument.

The President then reported an interesting case of calculus in the kidney. The radiograph (shown) distinctly revealed the existence of four stones in the right kidney. He was indebted to Dr. J. W. Taylor, M.Sc., F.R.C.S., professor of gynæcology at Birmingham University, for the Notes of the case.

The patient, aged 37, a married woman with two children, had suffered for three years from pyuria with a slow formation of a large tumour in the right loin. She had no other symptom—no hæmaturia, nor pain. By differential examination of the urine from the two ureters, pus alone was found to come from the right ureter; while the urine from the left ureter, though slightly albuminous, showed that the urea excretion was satisfactory. The right kidney was then explored and found to be simply a pus sac with no vestige of true kidney tissue, and there was a stone practically blocking the pelvis of the kidney. It was removed and the patient made a good recovery, but the urine continued to show the presence of albumen, and three months after the nephrectomy it was noticed that the left kidney was enlarging, though without any pain, tenderness, or increased frequency of micturition. The left kidney was radiographed with the aid of a diaphragm compressor and several stones were distinctly seen. A second operation was done by Professor Taylor, and he found the large stone blocking the pelvis of the kidney and two other stones embedded in the kidney tissue itself. These were removed successfully. The patient was now convalescent and appeared in better health than for some years past.

Dr. JONES thought the raymeter was very ingeniously contrived and likely to be of use in a good many experimental investigations. There was still much to be done in connection with photographic plates and penetration experiments. Slow plates, for instance, behaved very differently

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from rapid plates in some points and not in others. Some most interesting work might be done about the way in which different emulsions respond to the X-rays. Once, when using a tube with a resistance equal to 6 or 7 inches of alternate spark gap, and photographing a Benoist meter, he was surprised to find that the effect upon a slow lantern plate was practically nil, although similar exposures made directly afterwards with rapid plates gave very dense impressions.

The PRESIDENT, in reply, said he had had a dozen of his raymeters made for the very purpose which Dr. Lewis Jones had pointed out. Eight or nine years ago he had spent a considerable time during two years in investigating the effects of different coloured lights on photographic plates, and had read a paper on the subject before the Royal Photographic Society, and it had struck him since that similar work might be done in investigating the differences between the response to X-rays in various makes of photographic plates. Those differences were certainly enormous. Even with long exposures he found it impossible to get a proper image of his raymeter on some makes of plate because of the appearance of fogging. The varying amount of fog was due to the fact that the light was disseminated laterally in the film itself. If one took a piece of lead and put it over several different makes of plate one would find that the area of the fog varies enormously, even when a diaphragm was used. The very slow plates gave, generally speaking, the best results, and this was not only so in experimental work with metals but also in practical radiography, for he had found that the best photographs were taken with slow plates, though not necessarily with the very slowest. In South Africa he used the Castle plate, and his results, from the pictorial point of view, which is not necessarily the diagnostic point of view, were far better on those slow plates. In photographing chests, too, slow plates gave by far the best results.

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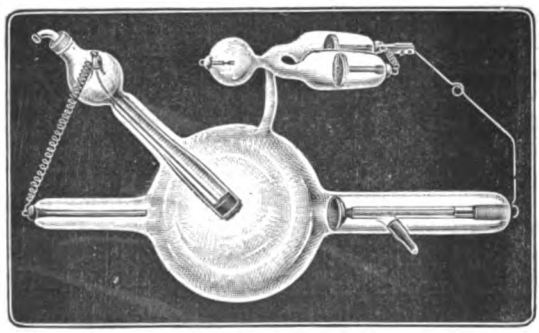

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MEDICAL
Electrology and Radiology.

No. 7. JULY, 1906. Vol. VII.

THE HISTOLOGICAL APPEARANCES OF IRRADIATED CARCINOMA.

Dr. R. Knox's paper in the *Lancet* of June 23rd, on the "Histological Examination of a Malignant Growth which has been subjected to X-rays," is interesting, for it seems to afford evidence of cicatricial and degenerative changes which may be presumed to have been due to the radiation.

The paper is accompanied by figures of the microscopic appearances of the gland in the neck which was submitted to the radiations, and Dr. Knox states that the specimens showed that the rays had had a direct beneficial influence over the new growth not only in the gland but also in the primary disease which was situated far back on the dorsum of the tongue. The primary growth was little, if at all, larger at the date of the patient's death than it had been a year previously.

We have once before met with a similar result in a patient to whom a course of X-ray treatment was given after the removal of enlarged cancerous glands from the cervical region. The breast had been removed on a previous occasion. After treatment by X-rays had been continued for two months some suspicious thickening was felt underneath the scar of the second operation wound. An operation was performed and the suspicious region was excised. A microscopical examination revealed fibrous tissue containing a few cells of suspicious character, but not of such a kind as to enable a diagnosis of carcinoma to be made with any certainty. It is interesting to remark that the tissues removed at the operation which preceded the use of X-rays were distinctly

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carcinomatous, with abundance of epithelial elements, and it is therefore quite possible that the X-ray applications had altered the character of the recurring growth in a beneficial way, although they had not succeeded in preventing recurrence altogether. The case presents another point of interest, for it shows that glands affected by squamous-celled epithelioma may respond favourably to X-rays, at least for a time; but on the other hand there are grounds for a suspicion that in this form of cancer X-rays may have a decidedly unfavourable action. Attention has been drawn once or twice to this peculiarity of squamous-celled cancer by speakers in this country, and abroad.

* * *

In view of the general belief that pressures of 250 volts and under are safe, so far as danger to life is concerned, it is noteworthy that the Electrical Inspector of Factories, in his report for 1905, records no less than six fatal accidents occurring on low pressure circuits during the year. All were due to alternating current, and three occurred upon consumer's premises. In one of these a wireman was engaged in wiring for an additional light in a cellar with a damp floor. He started work by connecting the end of a coil of insulated wire to the distributing board (220 volts), and then took his pliers to cut off the required length. As soon as the pliers cut into the wire he received a current through the pliers to earth which proved fatal. The Inspector also states that many accidents were due to faulty portable appliances, nine being shocks or burns received from portable lamps. These burns were due to short circuits at the lamps or at the flexible conductors at the point where they enter the lamp fitting, and where the insulating material on the wires is likely to be worn away by the edge of the fitting. This is a form of accident which may happen to anyone of our readers, and the need for attention to all flexibles cannot be too strongly insisted on.

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Case 2.—Lupus.
Before treatment.

Case 2.—Lupus.
After treatment.

Case 4.—Lupus.
A.—Before treatment.

Case 4.—Lupus.
B.—After treatment.

Case 6.—Lupus.
Before treatment.

Case 6.—Lupus.
After treatment.

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Case 16. —Rodent ulcer.
Before treatment.

Case 16. Rodent ulcer.
After 21st exposure.

Case 16. —Rodent ulcer.
After 28th exposure.

Case 23. —Mycosis fungoides.
Before treatment.

Case 23. Mycosis fungoides.
After treatment.

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NOTES ON LUPUS, RODENT ULCER, AND OTHER CASES TREATED BY X-RAYS.

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When I was asked by our worthy Secretary, Dr. Morton, to fill a gap at short notice, I proposed to give you the notes of some X-ray treatment cases, illustrating them with lantern slides I have made from photographs I have taken of these cases before, during, or after X-ray treatment. These cases are of the ordinary run of cases which now-a-days at a large general hospital are sent to the electrotherapeutic department for X-ray treatment, and have been treated by me at University College Hospital.

I will read to you briefly the notes whilst the slides are being thrown upon the screen for your inspection. We will first take some cases of lupus.

No. 1. Mrs. B. Patient had extensive lupus covering the whole of the face including both auricles, also extending over the neck to the roots of the hair behind. Patient had forty sittings when her condition was as shown in the slide. No active disease except on the helices of the ears and a small patch near roots of the hair at the back of the neck. These disappeared after a few more exposures.

No. 2. Mrs. D. Patient has had lupus of the nose since May, 1902. It has been scraped twice and treated by Finsen light for eleven weeks, last treatment six months before commencing X-ray treatment, when condition was as shown in slide. Patient has attended very irregularly during the year. Treatment was altogether suspended from February 17th to June 13th, during which time she had a confinement. Since June she had only one treatment in July, two in August, five in September, three in October, two in November, and two in December.

Present condition is shown in next slide. No lupus tissue and very little scar. Pot. permang. sat. sol. was applied once or twice in this case, previous to raying.

No. 3. Elsie F., aged 21. Fourteen years ago patient had an abscess on left cheek. A doctor lanced it, but three years later it formed again and was poulticed, but it never healed. Four years later patient was under treatment at St. John's Hospital (Leicester Square), there was slight improvement, but patient had to go and live in Devonshire, and continued using the ointment prescribed at this hospital. Soon the disease became much more active, and spread under

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the chin right over to the other cheek and then down the neck and on to the chest.

Four years ago patient came to University College Hospital for Finsen light treatment which she had for two months, when she had measles, and returned to Devonshire until October, 1902, when she returned to University College Hospital. In the following November X-ray treatment was commenced. The condition on commencing X-ray treatment is shown in the photos. Her condition improved rapidly at first, the result of the first twenty-nine sittings is shown in the following photos. Subsequent improvement has been very gradual, and cure was not complete when patient had to go to live in Devonshire in July, 1904, since when I have not seen her.

No. 4. Louisa G., aged 40. The disease first commenced when patient was 7 years of age (thirty-three years). Patient has been under treatment very many years by carbolic acid, etc., and has had also many scrapings. The diseased area increased steadily, spreading first on left cheek, then forehead, and now covers the whole face and neck. *See* slide A.

No family history of lupus. Patient attended forty-five times in 1903, the improvement was marked as shown in slide B. The following year she attended occasionally, average twice only each month. Further improvement is now shown, there being no active disease noticeable. *See* slide C.

No. 5. Mrs. H., aged 47. Patient has had small patch of lupus on tip of nose and left ala for ten years. Photo taken before commencing X-ray treatment. This has been a very obstinate case. Patient had seventy-seven exposures before there was any apparent cure, even then there was a slight recurrence, a small nodule showing in left ala, and she had to undergo further X-ray treatment. Her present condition is shown in the further photo. No lupus tissue, obvious. No scar.

No. 6. Annie S. Patient has been attending the skin department for eight years with lupus of the nose. The septum only was affected at first. Commencing at lower margin of left side of septum, it began to show externally about Christmas, 1902. Patient's condition before commencing X-ray treatment was as shown in photo. Patient had fifty-seven sittings when there was no lupus tissue to be seen, and the following photo was taken. Subsequently there appeared to be some activity inside left nostril, and thirteen further sittings were given the last five months ago, since which time there has been no further trouble.

No. 7. Ada H., aged 35. Small abscess came under chin when patient was 10 years old, this was followed by red

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scar, which was irritable, and commenced spreading. A small patch which came in front of right tragus was burnt and disappeared.

Mother has had lupus eighteen years, but is too old to attend hospital. At present there is a raised patch under chin, measuring 2 inches by 1 inch thick, raised covered by scab.

This patch was painted over with pot. permang. sat. sol. before raying. Patient had only four exposures, this was in February. There was considerable reaction. Patient came up two months later, when the lupus seemed quite gone. Patient was taken to Dr. Crocker, who sent the case for X-ray treatment, he told her further treatment was unnecessary.

No. 8. Geo. B., aged 22. Patient was under Dr. Crocker's care for lupus fourteen years ago, was treated for a year, and again came under his treatment eight years ago for a short time, since which time he has had no treatment.

A thick crusted lesion at the back of the neck was at first alone treated, this disappeared after eight rayings. (Photo now taken.) Both sides of neck and face and a considerable patch on right arm were now treated by the rays, patient attending eighteen times, when a thick crusted mass in front of left ear had separated, leaving an extensive suppurating surface which was dressed with boracic fomentations and slowly healed. Patient had no further X-ray treatment.

No. 9. Maud B., aged 24. Disease commenced twenty-one years ago when patient was 3, when she had enlarged glands (submental), which broke down, and were operated on (scraped or removed). Present condition started from above lesions and was treated at St. John's Hospital, Leicester Square (scraped, etc.). Patient first remembers at the age of 5. When 12 she was treated at Westminster Hospital, where she attended for three years irregularly. During this time it was scraped twice, gradually spreading first to one side then to the other. Once during this time she had three months at Margate Sea Bathing Infirmary, where it was scraped once. (Patient had also been at Margate Sea Bathing Infirmary previously at age of 9, when it was scraped once.) Patient has attended University Hospital, Skin Department, last three years. During the last two years she has had Finsen light treatment here, having over 500 exposures with much improvement. She came on February 10th for X-ray treatment, and the following photos were taken to show present condition before commencing X-ray treatment. Patient has attended very irregularly. Considerable improvement has been made chiefly in the middle of the diseased areas.

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No. 10. John M., aged 21. In 1890 a lump formed under patient's right jaw, this was lanced and then spread over cheek. In 1892 patient was admitted to Winchester Hospital where he remained three months, during which time he was operated on three times. He had discharge from the wounds and was again admitted in 1893, and operated on, remaining in hospital two months. He was then under a local doctor until February, 1900, when he was admitted to Guy's for nine weeks, during which time he had three operations. Since his discharge he has been under a local doctor. Patient has attended very regularly no less than ninety-two times. There is now no lupus tissue to be seen.

No. 11. Ethel S. Lupus of nose, first noticed August, 1901, gradually increased, was treated in Leicester for eighteen months but got progressively worse. In May, 1903, commenced Finsen light treatment, had about forty exposures, coming to town once a week. The left nostril has been very much ulcerated at times, and has been burnt with acid.

The disease started on the left side of nose, gradually spread over the bridge, and worked down to tip of nose and into left nostril. There is a small patch over right malar bone.

Patient had eleven exposures to X-rays at the hospital and subsequently in private another fifteen, and nine treatments with high frequency glass electrode in left nostril, when she appeared quite cured.

No. 12. Miss J. Six years ago a small pimple appeared near tip of nose a little to right side, this soon passed away and a few weeks later another came near the same spot and also disappeared later on. In April, 1899, it broke out fairly freely. It was scraped (by Mr. Pollard) under chloroform and was cauterised. It kept well to March, 1900, when it showed signs of reappearing and broke out freely in April. She was again treated in a similar manner by Mr. Pollard, but this time it was scraped both internally and externally. It healed up nicely. In the following April it threatened to break out again but seemed to pass off. In April of this year (1904) it became very active, the whole organ was much inflamed and enlarged, but it began to improve towards the latter end of June and assumed the appearance shown in photo taken immediately before commencing X-ray treatment. September 19th.

Patient's mother suffered from similar complaint.

From September 19th to the end of the year patient was treated thirty-seven times. Much improvement has taken place, but the end of nose is very red. High frequency glass electrode used and the disease completely disappeared.

No. 13. Edward P., aged 14. The disease commenced three years ago, patient cannot remember how. At present

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it affects the septum of the nose, which looks excoriated, the tip of the nose, which is inflamed, and there is a dirty scab at the extreme end of the tip of nose. The growth was scraped on 31st of May, 1904. X-ray treatment commenced 28th September.

October 14th the swelling at the tip of the nose has subsided marvellously only a small spot showing sign of disease. There has been no scarring.

Rodent Ulcer.

No. 14. William B. Patient is a carman, 48 years of age. Seven years ago a little black spot came at top of right naso-labial fold, which gradually increased in size. Frequently a crust separated and he thought it had gone, but it always returned in about a week.

At present there is a scab about ½ inch in diameter, situated on the right ala of the nose. Patient has been very deaf for seven years. January 20th, patient has had ten exposures to X-rays. Scab separated after four exposures and a smaller one has formed since. His hearing has much improved.

February 29th. Patient complained of soreness last two days, above ulcer. Now gone. Scab separated on February 27th, another formed and separated on March 20th, another smaller formed and was thrown off on April 4th.

Last treatment was given April 25th.

May 2nd. Patient came for inspection, ulcer apparently quite healed. Patient was told to come up for inspection in a month. Still healed.

No. 15. Emma G., aged 48. Patient had rodent on nose as shown in photo. X-ray treatment commenced February 19th. A considerable mass separated from the nose on March 3rd. There was no bleeding, a dry surface being left. Treatment was continued until patient had had twenty-one exposures, when she appeared quite cured. Patient was heard of some months later, there had been no further trouble.

No. 16. Selina T., aged 74. Nine years ago a small white "knob" appeared a short distance in front of her left ear. This was scratched, the skin was broken, and it has never since healed. An ulcer formed, which has gone on, slowly spreading. It was only slightly painful until six months ago, when the pain became much greater, and the growth of the ulcer more rapid. Present condition shown in photo. Pain relieved after third raying and has not returned.

June 27th. Patient has had twenty-one exposures. Condition on photo No. 2. After twenty-eight exposures, in all, the whole ulcerated area in front of the ear is completely healed. The scar is smooth and fairly supple. Third photo

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taken. There is a small ulcerated crack behind the lobule of the ear.

No. 18. Chas. C., aged 78. Patient was knocked down by a cab two years ago and had a wound in sacral region the size of a shilling. This never healed, it was kept sore by his lying on his back in bed. He used pads. Some months after the accident he saw a doctor who advised him to have it cut out. Patient would not have this done as it was not painful, but now as it has not healed for two years he came to this hospital for treatment. Condition before treatment shown in photo. From May 20th to July 13th patient had twenty-one exposures, the place being then healed.

Cancer.

Nine cases, chiefly breast cases, inoperable and recurrent, were treated during the year, the result being usually relief of pain by about the fourth exposure. A decrease in the amount of the discharge and a less unpleasant odour generally resulted. In two still under treatment there is a decided shrinking of the cancerous deposit.

Sycosis.

No. 19. Ernest C., aged 26. Chin and upper lip covered by sycosis. Patient was rayed five times six to ten minutes, when the hair was coming out freely and the treatment stopped. Patient came up a fortnight later and was quite cured.

No. 20. Francis C., aged 38. Coccogenic sycosis, seven months' duration, commenced on upper lip. Affected area now includes upper lip, chin, side of face and part of scalp. Patient was rayed seven times six to ten minutes. Last exposure April 25th. Patient came on May 13th. Complete epilation after the seven exposures, and disease cured without any other application.

No. 21. Walter G., aged 30. Commenced as a small pimple on the left naso-labial ridge when patient grew a moustache. He has not worn moustachios during last four years. It spread first over left upper lip, then over right upper lip. It used to discharge much, but not lately, there being only small pustules. Patient had three exposures of ten minutes each, last on August 12th. Came up on September 2nd, completely epilated and apparently cured. Patient was taken to Skin Department, whence he was first sent for X-ray treatment, and was told no further treatment was necessary.

September 26th. Patient came back with small pustule on right side of upper lip, and said there was another which

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he had rubbed away. He was again given ten minutes' exposure three times a week, other pustules joining and more coming in the septum of the nose. All the pustules eventually cleared up and patient was cured. He had altogether eighteen exposures.

Mycosis Fungoides.

No. 22. Mr. S. Patient supplies the following written history with photograph which was taken some time ago. . . .

No. 23. E. H., aged 31, July 1st, 1904. Thirteen years ago patient was covered from head to foot with scaly eruption, which eventually disappeared. He lost his hair during this attack.

The eruption has not appeared on the trunk since until the present attack, but the head, arms, and feet have been attacked at various times. Sometimes it has been better, sometimes worse, and the skin has scaled off. About three months ago it appeared on the forehead, spread downwards in front of the ears and over the scalp. He has lost more hair in consequence. A fortnight later it spread to the back, and patient was admitted under Dr. Crocker. The eruption on the back shows scaly scabs, and tends to be arranged in lines which radiate downwards and outwards from the spine. Patient complains much of itching. July 8th. Itching, which has been very marked, was less after the first exposure. It disappeared altogether after the third exposure and has not returned.

July 11th. The silvery scales became sodden, and are shed, leaving a red, somewhat moist surface, flecked with yellow points. These red surfaces bleed occasionally.

October 19th. The treatment has been entirely confined to the back of the body up to to-day. Patient is now treated with tube in front of each shoulder. Present condition, very little to be seen of the disease.

In these cases of mycosis fungoides the intolerable itching, which was so great a source of trouble to the patient, was relieved by two or three rayings.

Sarcoma.

No. 24. Thos. F., aged 52. Patient had a small sarcomatous growth removed from inside mouth six months ago. Has now a large swelling occupying right parotid region and right lower jaw, which causes him very great pain. He was first rayed March 18th. After the second raying the pain was much less, but later on again became severe. Patient had nine rayings, and was then too ill to attend further. Pain became very great, and he died about three weeks later.

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No. 25. Geo. L., aged 40. This was a case of recurrent sarcoma (endothelioma) of right orbit. First symptoms, as far as noticed, occurred early in 1901. Vision of right eye not so good, and there was some inflammation. He was treated in private one month, then sent to Moorfields, tested for glasses. In a few months glass for the right eye had to be altered, and again a few months later. The eye was much inflamed and painful at times, followed by a period of ease. Gradually the eyeball protruded downwards and outwards. In 1902 patient saw Mr. P. Flemming, entered U. C. H. December 15th. was operated on and remained in hospital 4½ weeks. Attended as out-patient until June 26th, 1903, when he was again operated on for tumour. The eye was removed, but not the lids. Slight growth began to develop at outer edge of orbit. This and the lids were removed at an operation on December 23, 1903. Good progress seemed to be made until March, 1904, when a swelling was noticed below the orbit. Two weeks before Easter great pain was felt, with shooting pains across the temple. The growth was removed by Mr. Raymond Johnson on April 7th, 1904, but the pain was not relieved. May 23rd came up for X-ray treatment. There was a hard fixed swelling at lower and anterior part of orbit. Patient was rayed twice or three times a week. July 6th. So far the result has been nearly complete freedom from pain before complained of, this ease dates from May 31st, when he had fourth raying. Patient says he is still in a state of comparative ease and comfort. September 2nd. Patient has had no treatment since August 12th, and the pain returned during the last week. This was soon relieved, and patient has since attended fairly regularly three times a week. There has been a slight increase of the growth, but he is fairly comfortable, and is still under treatment February 13th, 1905.

Eliphantiasis Græcorum.

No. 26. Emily S. Patient commenced treatment November 11th, 1902, and up to September 12th, 1904, had no less than 118 exposures to the rays.

Xanthoma Tuberosum.

No. 27. Richard H., aged 21. The growth in the skin first appeared seven years before admission when patient was 14 years old. It appeared simultaneously on the elbows and knees, and has since spread until it attained its present dimensions. Two years ago a patch appeared near inner canthus of right eye. This patch was removed and there is now a yellow scar left.

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Patient attended skin department as out-patient three years ago.

Family history : Father and mother both living, has three sisters and six brothers, none of whom have suffered from this disease.

X-ray treatment commenced July 13th, 1904.

October 18th, signs of spreading on inner side of left elbow.

By the end of the year the growth had ceased to spread. The patches are covered with scaly skin, which is not thickened in centre, but around margins are numerous yellow nodular thickenings.

On the left arm over the internal condyle is a round patch the size of a shilling, with very little thickening ; connecting it with the main patch are several small red nodules.

Patient is still under treatment. His present condition is shown in the following two photos.

NEW APPARATUS.

The Radiometer Holder of Messrs. W. Watson & Sons is a very convenient form of apparatus. Much difficulty has been experienced by workers with Sabouraud's pastilles in conforming with the directions issued with them. Briefly, the instructions are as follows, and unless these are carefully observed the pastilles are practically valueless :

The pastille must be placed exactly midway between the surface which is being treated and the anticathode of the X-ray tube.

A metal back should be placed behind the pastille.

Ordinary light must be excluded during exposure, as under its influence the pastille tends to regain its original colour. It must, therefore, be examined with as little exposure to daylight as possible.

Actual contact with the wall of the tube is undesirable, as the heat generated on the anticathode affects the pastille.

The radiometer holder illustrated is adapted to meet the fore going requirements :

It is attached to the cathodal end of theX-ray tube.

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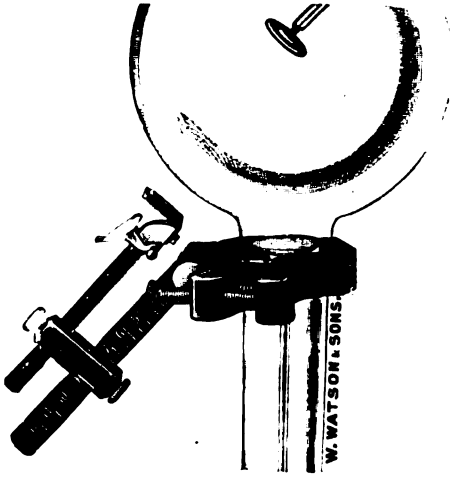
The support for the pastille is hinged and fixed on a hollow stem in order that the anticathode may be viewed through the long axis of the stem, and in this manner adjusted in a straight line with the anticathode. In order to permit this, the support and its shield can be turned on one side.

The traveller on the divided arm is placed on that division which is equal to the distance in centimetres from the anticathode to the wall of the tube.

Fix the pastille under the clip and push forward the rod until the cardboard shield is in contact with the glass wall of the X-ray tube.



The distance from the skin of the patient to the wall of the tube is then measured in centimetres, and the distance from the anticathode to the wall of the tube is added and the sum divided by two, and the traveller is then placed on the corresponding division of the scale.

The pastille is examined and compared with the standard tint without moving the patient, by turning it down by means of the small milled head provided at the side for this purpose.

The price of the holder is 22*s.* 6*d.*

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ERRONEOUSNESS OF THE RADIOMETRIC INDICATIONS FURNISHED BY PLATINO-CYANIDE OF BARIUM.

Observations and Researches by Prof. CARLO COLOMBO.

Lecturer on Physical Therapeutics in the Royal University of Rome; Director of the Central Institute for Physical Therapeutics.

There are, essentially, two methods proposed for the quantitative measurement of the dose of X-rays: one constituted by the electric measures, the scientific method *par excellence*; the other based on special reactions of a chemical nature, which are presented by certain substances exposed to the X-rays.

The electric measurements have not yet entered into the practical field for several reasons; although the inventors of apparatus believe, each on his own part, that he has solved this difficult problem.

On the other hand, considerable practical success has been obtained by radiometers based on the chemical reactions. Of these the most universally known are the chromo-radiometers of Holzknecht, and the X-radiometer of Sabouraud and Noiré.

The first of these two apparatus, the origin and starting point for all the others, has now become a museum curiosity; for, since 1903, it has been impossible to find it in commerce, and it seems that its inventor has discontinued its manufacture.

The field therefore is now occupied by the X-radiometer of Sabouraud-Noiré; and this apparatus has spread through the world as the sole means, at once simple and practical, of measuring, not indeed the *quantity* of Röntgen radiation emitted by the Crookes's tube—as would be the case with an electric measurement—but the *quantity* of rays absorbed in a given time per unit of surface by the part exposed.

It is therefore interesting to know what value the apparatus of Sabouraud and Noiré really has, as on its exactitude depends the good or evil that may be produced by radiotherapy.

It is known that the radiometric method of Sabouraud-Noiré consists in exposing to the X-rays pastilles of platino-cyanide of barium, cut from an ordinary fluorescent screen, such as are used in radioscopy. The unused pastilles are of a pale green colour, but exposed in the vicinity of a tube in action they become slowly yellower, and pass from pale yellow to orange yellow, and finally to a brown colour.

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The inventors of the apparatus (1), profiting by this reaction of the platino-cyanide of barium, have been able to establish, by very numerous experiments, a kind of colorimetric scale in proportion to the *quantity* of X-rays absorbed by the salt.

Thus, when the pastille of platino-cyanide of barium exposed to the X-rays has assumed an orange-yellow colour, similar to that of the standard tint supplied with the apparatus, the inventors affirm that it has absorbed a quantity of rays corresponding to the maximum dose that the human skin can bear without evil consequences, such as erythema, loss of hair, and desquamation, that is to say, a radio-dermatitis of the first degree.

And since this dose corresponds to that indicated by the fifth gradation of Holzknecht's chromo-radiometric scale, it has been agreed to value it as equal to 5 units H.

The pastille of platino-cyanide of barium should be placed, according to the instructions issued with the apparatus, midway between the anticathode of the tube and the surface to be irradiated, or, more precisely, at 7½ cm. from the anticathode; for Sabouraud and Noiré consider a distance of 15 cm. between the anticathode and the surface of the part to be exposed to the X-rays, as the proper distance.

The pastille passes from pale green to orange in a longer or shorter space of time, according to the greater or less quantity of X-rays which it absorbs.

These fundamental axioms have been accepted, and the standard tint furnished by Sabouraud and Noiré constitutes the limit-dose.

But by degrees doubts arose as to their exactitude. Many observers had remarked that, after administering quantities of X-rays controlled by the radiometer, and presumably innocuous, they had produced serious radio-dermatitis; while, in other cases, doses considered, on the authority of the pastille, as very high had not produced any sensible reaction. And to explain this they fell back on the hypothesis of idiosyncrasy.

Surprises of this kind have happened to myself, when I felt sure that the error could not have been due to the apparatus producing the X-rays. Defects of insulation in the bobbin, variations in activity in an electro-static machine, and, above all, variations in the working of the interrupter, might cause considerable changes in the working of the tube during the course of an application of X-rays.

But I considered myself able to exclude all these inconveniences; for I use the Gaiffe apparatus with a closed magnetic current (without interrupter), working by means of the alternate monophase street current, at 102 volts with forty-three periods.

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Two Villard valves, arranged in shunt to the tube, separate the two semiphases, letting one only pass into the tube, and always in the same direction. A Beclère spintermeter is inserted to measure the length of the equivalent spark gap, and thus the hardness of the tube.

A Gaiffe milliampèremeter gives the magnitude of the current which traverses the tube, and serves as a control.

Any cause of error could therefore only proceed from the inexact indications of the X-radiometer.

In order to understand the phenomenon I instituted a series of experiments.

Experiment I.

I put in circuit a Chabaud tube, large size, with Villard osmo regulator. I brought the tube to a degree of hardness corresponding to No. 8 of Benoist's radiochromometer, and made it work at a medium intensity.

The following were the constants of the tube :

55 volts in the primary.

12 cm. of equivalent spark gap.

0·3 milliampère of current in the tube.

The anticathode did not become red hot.

Having placed the pastille of platino-cyanide of barium at 7½ cm. from the anticathode, I started the tube, maintaining it constantly at the hardness of 8 B. After 75 minutes I obtained an orange-yellow colour, similar to the sample of the radiometer.

This allowed me to conclude that my tube, maintained constantly at the above-specified *régime* of work, would give a dose of 5 unit H. in 75 minutes, that is 1 unit H. in 15 minutes, at a distance of 15 cm. between anticathode and skin.

Experiment II.

Then using the same tube, arranged to give less penetrating rays, such as are used to treat superficial affections of the skin, at a degree corresponding to 6 Benoist.

The constants then were—

55 volts in the primary.

10 cm. of equivalent spark.

0·4 milliampère of intensity in the circuit of the tube.

The anticathode took a cherry-red colour.

The pastille of Sabouraud-Noiré reached the sample colour in 68 minutes ; thus the tube administered 1 unit H. in 13½ minutes, at a distance of 15 cm.

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Experiment III.

I then made the tube very soft, so as to produce rays whose penetration should not exceed 3 Benoist.

The conditions then were—

40 volts in the primary.

5 cm. of equivalent spark.

0·6 milliampère of intensity in the circuit of the tube.

The anticathode became bright red.

It was evident by inspection of the phosphorescence of the wall of the tube that the amount of rays produced under these conditions was inferior to that produced in Experiment II; and this was also to be seen from the fluorescent screen, but the pastille of platino-cyanide of barium took the orange-yellow colour of the standard tint in 57 minutes, corresponding to a dose of 1 H. in 11½ minutes, at the usual distance.

There was evidently an error, and the cause of it was to be sought.

I repeated the experiment several times, always with the same result.

I also took care to examine the pastille by daylight, and as nearly as possible at the same hour, and with the same incidence of the light; for these precautions are not unimportant in judging of the colourisation of the pastille.

Experiment IV.

I then had recourse to another tube of the same Chabaud pattern, but of smaller dimensions. As this was a tube of the same make and quality, the procedure used for the larger tube should have given with this one the same intensity of radiation.

On the contrary, when the tube was regulated to 6 B., as in Experiment II, and set to work with the same constants, of

55 volts in the primary.

10 cm. of equivalent spark.

0·4 milliampère of current.

With a cherry-red incandescence of the anticathode, the pastille reached the sample colourisation in 86 minutes, corresponding to the dose of 1 H. in 17 minutes!

Surprised at this result, I compared the intensity of radiation in the two tubes working under the same *régime*, by examination with the fluorescent screen, and convinced myself that the intensity was evidently similar.

The pastille in this experiment, though at the regulated distance of 7½ cm. from the anticathode, it was distant from its walls by about 4 cm. by the smaller diameter of the tube,

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while in Experiment II. it was at only 2 cm. from the walls of the tube, which had a larger diameter. It was evident that the pastille, in Experiment IV, placed further from the walls of the tube, although it absorbed the same quantity of X-rays as in Experiment II, would have received a different quantity of heat rays; and it appears that the calorific rays, as well as the X-rays, contribute to the changes of colour of the pastilles.

In Experiment III the pastille, though not absorbing a great amount of X-rays, probably received alarger quantity of heat rays, as the platinum was more incandescent.

Experiment V.

To verify the action of the heat rays I placed a pastille of platino-cyanide of barium near an ordinary electric incandescent globe, at a distance of about 2 cm. from its glass wall, so as to be in conditions analagous to those of the Crookes's tube.

After 1 hour 3 minutes this had assumed the orange-yellow colour of the Sabouraud-Noiré sample, perhaps a trifle browner. I measured with the thermometer the temperature to which the pastille was exposed. It was about 60 degrees centigrade.

Experiment VI.

To exclude direct irradiation from the incandescent light, I interposed between the globe and the pastille a glass bell coloured green; with the pastille distant from the walls of the globe by about 5 cm., and exposed to a temperature of about 28 degrees centigrade, it took the colour of the sample in a little more than 6 hours.

Experiment VII.

To exclude all action of luminous rays I placed the pastille in the vicinity of an ordinary stove for steam-heating, at a distance of about 10 cm. from its surface; it was thus exposed to a temperature of about 45 degrees centigrade, and assumed the characteristic colour in about 3 hours 45 minutes.

This showed that platino-cyanide of barium is considerably influenced by heat rays, and that the change of colourisation in the pastille of Sabouraud-Noiré may not correspond exactly to the quantity of Röntgen rays absorbed by it.

This behaviour of platino-cyanide of barium also clears up the following facts, which otherwise would remain incomprehensible.

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It often happened to me to obtain the characteristic colour change in 65 to 68 minutes, working as in Experiment II, and using pastilles kept in a fairly dry place; while it needed 12 to 15 minutes more when I used pastilles kept in a damp place.

The scientific explanation of this phenomenon is given by Bordier and Galimard (2), who have succeeded in demonstrating that the passage of the platino-cyanide of barium from a pale green colour to orange-yellow is due to a process of dehydration, which takes place on exposure to Röntgen rays, or to moderate heat or solar irradiation, or if the salt be kept under a bell-jar, in the presence of sulphuric acid.

Thus it is natural that pastilles, kept in a damp place, should require a longer time than those kept in a dry place to become completely dehydrated.

* * *

I have already remarked on the fact that the change of colour in the pastilles of Sabouraud and Noiré is differently appreciated, according as it is observed by daylight or by artificial light; at a certain incidence of light rather than at another.

Messrs. Sabouraud and Noiré say nothing on this point in the notes attached to their apparatus; but it is evident that the appreciation should be made by daylight.

With the conditions of Experiment II, the pastille placed at 7½ cm. from the anticathode acquired the characteristic colourisation in 68 minutes if observed in full daylight. But, the above-mentioned conditions remaining the same, the colourisation appears to be already reached after 50 minutes, if the pastille is observed by the half-light of twilight, and assumes the orange-yellow tint still more quickly, in about 26 minutes, if the pastille is observed by the light of an ordinary electric incandescent globe of 16-candle power. The error, in this case, assumes enormous proportions, for it reaches 62 per cent.!

There is also a notable difference in appreciation, according as the pastille is looked at in such a way that the light falls in a perpendicular incidence on its surface, or in an oblique direction. In the first case it appears slightly paler.

From what has been stated, it results that complete reliance cannot be placed on the exacitude of the dose measurement furnished by the X-radiometer of Sabouraud-Noiré.

Nevertheless, this apparatus, when judiciously employed, is always of great utility. But one should not be satisfied simply with the data furnished by the pastille of platino-cyanide of barium. It is necessary to control the results

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obtained, until an apparatus be provided which shall be scientifically exact in measurement, we must be content with the means which are at our disposal.

A good control, in the meantime, is the Gaiffe milliampèremeter, and no radiologist should be without it.

It is a general conviction that the only electric measurement can be given by the exact radiometer of the future.

And who knows if such is not destined to be the electrostatic radiometer which is in course of preparation by François (3), or the radiogenometer of Alfred Dean?

That is what a not remote future will show.

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NOTES AND ABSTRACTS.

Damages for X-ray Burns.—A case of this kind was recently concluded in Vienna, and large damages were awarded to the patient. In 1902 a man suffering from psoriasis, but otherwise healthy, consulted Professor Lang, director of a clinic for diseases of the skin. After trying various other remedies, which proved useless, Dr. Lang suggested the application of the X-rays, and recommended the patient to Dr. Holzknecht, director of the X-ray department of the Vienna General Hospital, for this application. As a consequence of the X-ray applications the patient was extensively burnt on the back and on some parts of the leg, and painful ulceration developed, which kept him away from his office for many months, leaving bad scars and cicatricial contractions after completely healing. During the trial it was elicited from witnesses that in 1902 the technique of the administration of X-rays was not so well known as now, and although dermatitis had been noticed as an after-effect of such application, it was quite an unexpected complication. The patient alleged that both medical men had failed to warn him beforehand of the risk he was incurring by submitting to the new treatment, and that it was an inadequate way of dealing with his complaint, because there were other remedies which could have been employed without any risk whatever. He claimed £4,200 (100,000 kronen) and £200 for medical fees and other expenses. After several adjournments, rendered necessary by the summoning of X-ray authorities (from Berlin and Heidelberg) to give evidence, the jury found verdict for the plaintiff, and awarded him £1,250 damages and £200 costs. The judge remarked that it ought to have been pointed out by Dr. Holzknecht that the possibility of burns and scalds was not excluded, and as the patient had been laid up for months and suffered both in body and in mind, adequate compensation was only just.

In another case of X-ray injuries, heard before a court, a dermatologist, who was treating a patient for favus, was called away very urgently, and left the patient in charge of a private assistant nurse, who continued the administration of the X-rays. By some mishap the patient received such an amount of rays that bad burns developed on the forehead and left cheek. The medical man in question had to pay £150 damages.—*Brit. Med. Journal.*

* * *

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The Manual Treatment of Sciatic Neuralgia.—M. Berne is of opinion that massage almost always relieves the various neuralgias of the sciatic nerve, and that when combined with certain manipulations it very often yields a successful result in obstinate cases, always provided that the disease is peripheral and neuritic in character ; cases of central origin are not amenable to the treatment. When there are lameness and muscular retraction straightening of the limb may be tried. M. Berne has for the last twenty years employed what he designates as "the knee method." The sciatic nerve, passing between the posterior border of the great trochanter and the ischium, rests, as is well known, on the spine of the ischium, against which the flattened trunk of the nerve can be easily compressed after leaving the pelvis. It occurred to M. Berne that this anatomical arrangement might be made to serve a therapeutic purpose by enabling the nerve to be compressed against the adjacent bony surface, and he described his procedure at a meeting of the Société de Médecine de Paris held on April 28th. Having caused the patient to lie at full length in the dorsal position on a low couch, M. Berne stands on the affected side. If the sciatica is in the right thigh M. Berne flexes his right knee and holds it firmly against the patient's right sciatic notch ; he then seizes the extremity of the patient's right lower limb and flexes the thigh on the pelvis with the leg extended on the thigh. In this way he exerts gentle progressive stretching, quite free from danger, and not requiring the administration of chloroform. This method has given excellent results in old cases of sciatic neuritis occurring in patients who had derived no benefit from the ordinary and recognised forms of treatment. In the manual treatment of sciatica M. Berne is in the habit of supplementing this extension by various movements, including active and passive adduction and abduction of the affected limb, together with movements of circumduction and flexion combined with rotation of the trunk. All these manipulations are, however, of secondary importance in comparison with the prompt and effectual action of the "knee method." It is important to remember that, as already mentioned, the disease must be some form of sciatic neuritis having a peripheral origin. In reply to M. Coudray, who asked a question relative to sciatic neuralgia due to the presence of dilated veins at the point of emergence of the sciatic nerve, M. Berne said that he had seen cases of this kind, in which the pain was caused by varicose veins pressing on the nerve, but he had always declined to undertake the treatment of them because they were purely surgical cases which could only be dealt with by removing the conditions which brought about the compression.—*Lancet*, May 19th, 1906.

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

ORDINARY REPORT OF THE THIRTY-SEVENTH MEETING ON MAY 25TH.

(*Continued from page 150.*)

Dr. E. S. WORRALL then read the Notes of some cases of skin disease treated by X-rays. His remarks were illustrated by lantern slides from photographs taken in almost every case before, during, and after treatment. For the most part they were cases attending in the electro-therapeutic department of University College Hospital, chiefly cases of lupus, sycosis, and rodent ulcer. In one very extensive case of lupus the patient, a young man, showed a manifest improvement under the X-ray exposures, of which he had twenty-seven. Before the X-ray treatment was commenced he had had 500 exposures to Finsen light, but without much benefit. In one case of lupus of the nose the patient was treated on five occasions by means of a high frequency glass electrode placed in the nostril, and the lupus cleared up entirely under that treatment. Another patient, a man nearly 60 years of age, had an extensive area of rodent ulcer spreading down the left cheek. There had been recurrence after surgical treatment, and the eye-ball had been removed. After a period of quiescence the rodent ulcer again broke out. Nothing further could be done surgically, and so he came under X-ray treatment. He improved at first; twenty-seven exposures were given, and he quickly experienced relief from his pain. Later, however, the disease was again rampant, and treatment by radium emanation was being tried. Other cases shown included some of sycosis and of xanthoma tuberosum, in which latter the X-rays produced a great improvement. In most cases the character of the cicatrix was all that could be desired.

The PRESIDENT, after thanking Dr. Worrall, said that he was surprised to hear of the large number of applications given in some of the cases. Of course, in very extensive cases of lupus it was often necessary to continue the applications for a very long time. But in one of Dr. Worrall's cases—a small case of lupus on the nose—no fewer than seventy applications were given. Certainly the results shown seemed to justify the perseverance, even though at first no good result was apparent. Recently he had to deal with a

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case which he thought unusual. It was one of a small rodent ulcer in the cheek about the size of a shilling. After fifteen exposures to the X-rays a little dermatitis appeared, and he thought it would entirely heal. As a matter of fact it did heal, with the exception of a spot the size of a pea. He congratulated the patient upon having made so good a recovery, but to his astonishment within five days the ulcer had broken out again and become as bad as it was at first. He had never before seen a rodent ulcer return so rapidly.

Dr. C. J. HEATON, after thanking Dr. Worrall for his paper, said that one point of interest in the photographs was the difference between the ulcerous variety of disease and the fibrous. He had been treating patients by means of X-rays for over a year, and found that all did very well up to a certain point, and looked at first sight as though they were cured, but a closer examination revealed the presence of foci, and suggested the question whether these foci could really be cured by X-rays.

He was over in Paris last year, and noted with much interest the methods employed in the hospitals there. The high voltage of 260 was in use, with a Gaiffe break at a very rapid method of rotation, and no reaction was ever experienced. The results seemed to be perfect. He was at the London Hospital lately watching Dr. Morton's work, and there noticed that the process was exactly the reverse. The operations were very slow indeed. The Gaiffe mercury break was modified so that it turned round very slowly, but there, too, good results were obtained. He was told at the London Hospital that though they often obtained a cure up to a certain point, beyond that it seemed impossible to go. In regard to the question of the Finsen light in carcinoma, he thought that everyone would admit that carcinoma cases did best with X-rays.

Dr. G. H. GRAHAM asked for more details of the Finsen treatment in the cases in which it was employed by Dr. Worrall. In his own opinion there was no lamp equal to the Finsen lamp. He decidedly preferred its use in cases of lupus to that of the X-rays. The X-ray treatment, if prolonged, damaged the skin, and cases of epithelioma following the treatment of lupus by the rays were not uncommon. A case in point was brought before the Clinical Society not long ago. A woman was treated with only one exposure of ten minutes, and a very severe burn, followed by epithelioma, developed.

Dr. ALLPRESS SIMMONS had found in his experience that the cases treated by X-rays reached a certain point of improvement and no further. Difficult cases of lupus in which there was a certain amount of discharge were sent by him to St. Thomas's Hospital, and after treatment under the

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Finsen lamp they generally came back absolutely cured. He was getting rather shy of going on with the X-rays continually in such cases because, after a certain amount of exposure, the progress seemed to cease.

Dr. WORRALL, in reply, spoke of the point touched upon in the discussion respecting the very large number of exposures that some of these cases had received. He had appreciated the difficulty and perhaps had been rather overcautious, but he felt the need that there was for some definite system of measurement. On that account he had been very careful in the doses given. He had been giving X-ray treatment for three or four years, and had made three or four thousand exposures each year, without any regrettable burn. Latterly the number of exposures has been considerably reduced, because we now were able to employ something approaching measurement in dosage. He had had to use various instruments in the making of exposures, and had used three 10-inch coils. One was worked with a set of accumulators at 24 volts. Another was worked from the 220 volt mains on a branch circuit, with a resistance and with a mercury jet break. Another was worked with a platinum break. He had all these coils going at once, and the doses varied rather widely. With the apparatus worked by the accumulators and mercury break he had observed a much more rapid effect in a given number of minutes and at a definite distance from the tube than with the tube (in a similar condition, as far as one can judge) and the platinum interrupter.

It was true that many cases of lupus cleared up rapidly to a certain point, beyond which it seemed impossible for them to go. Sometimes the cases were then sent back for a scraping operation. In one case which was scraped before it came to him, and in which there was a bleeding surface, he gave only four exposures to the X-rays, and it healed up at once. The patient has not been back for further treatment, and he felt sure that had there been any fresh trouble the patient would have come back. He felt that something more was wanted than merely to go on with the raying. Perhaps if one could conjoin some other mode of treatment to that of X-rays, really satisfactory results might be secured in lupus.

Personally he had not used the Finsen lamp. The Finsen treatment in the cases referred to in his communication was given by the clinical assistant in the skin department, and he considered the particular type of Finsen lamp used at the hospital to be of little value, though a suitable Finsen lamp might probably be found very useful in these cases.

The CHAIRMAN, in announcing the completion of the evening's business, mentioned that the next meeting of the Society on June 22nd would be the occasion of the Annual

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Dinner, and he hoped Members would do their best to be present.

* * *

The Thirty-eighth Meeting of the Society was held at the Criterion Restaurant, on Friday, the 29th of June. The minutes of the previous meeting were read, and the following gentlemen were elected members of the Society: Drs. Robert Bishop, P. C. Fenwick, Thurstan Holland, J. Ellington Jones, and P. Lambert. Fourteen members and four guests then dined together. In the absence of the President the chair was taken by Dr. Lewis Jones.

The CHAIRMAN, in giving the toast of "The British Electrotherapeutic Society," said that the roll of membership was steadily increasing, and that most of the medical officers in charge of electrotherapeutic or X-ray departments in London and the Provinces were now members of the Society. He wished that he could say that all of them had joined, but he feared that there might be some who were still hesitating, perhaps from timidity, or from uncertainty as to how the Society might succeed. The Society was a new one, and in some respects might be compared to the early Christians, who, as his hearers knew, had occasionally to put up with the cold shoulder. Still, he did not think that that did any great harm to members, who could the more easily bear any want of sympathy they might sometimes be conscious of, by the proud feeling that they were carrying on outpost duty on the extreme borders of the domain of medical science. They must therefore not mind being somewhat isolated when their work carried them far beyond the routine of ordinary general practice, and it should tend to develop such qualities as self-reliance, vigilance, and caution. If, in their advance, they met obstacles in one direction they must be ready to find a way round, for, above all things, they must continue to advance. The position had its charms, as they all doubtless felt. The British Medical Association had kindly sent them, as representative, his old friend, Dr. Guy Stephen. In welcoming him as their guest he wished to say that no doubt, in the fulness of time, that Association would desire a section on Medical Electricity, and would then find that such a section was generally appreciated. In the meanwhile there was ample scope for hard work within the limits marked out by the Society; in fact, there were numbers of debatable points crying aloud for accurate scientific investigation. When would some member take up the examination of the behaviour of dry plates to Röntgen rays? When were they to have a report of work done with mechanically interrupted currents? Who was going to investigate afresh the work of Moutier

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and others on the influence of auto-conduction in arterio-sclerosis. And there were many other directions in which more information was desired.

In response to the toast of "The Guests," Dr. GUY STEPHEN spoke sympathetically of the difficulties attending the new branch of medicine which was included under the term of Physical Therapeutics, and wished success to the Society.

Professor SODDY expressed his pleasure at meeting members of the British Electrotherapeutic Society, and pointed out to them that new knowledge was apt to spread slowly, so far as its practical applications were concerned.

Music was provided, and several other speeches were given, and the gathering broke up at 11 p.m.

The dinner was worthy of a better attendance, and members would have done well to come in larger numbers.

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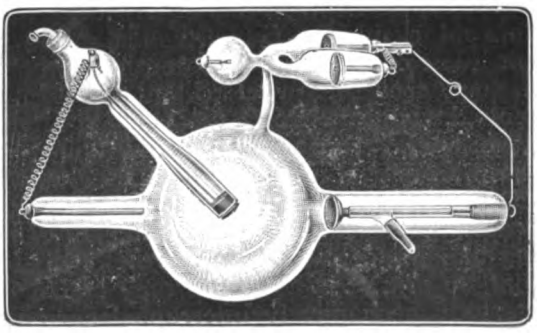

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MEDICAL

Electrology and Radiology.

No. 8. AUGUST, 1906. Vol. VII.

THE PROVINCIAL MEETING.

The meeting of the British Electrotherapeutic Society at Bristol passed off very satisfactorily, and certainly served to give the impression that a Provincial Meeting is valuable in the best interests of the Society. A considerable number of visitors were present, and it was evident that they were much interested in the proceedings, and in the welfare of the Society itself. The most disappointing feature of the gathering was the absence of most of the Society's officers, but, happily, the energy of the Provincial Secretary and the valuable assistance given by Dr. J. Taylor sufficed to avert any difficulties which might have arisen from that cause. The papers read were decidedly above the average in merit, inasmuch as they were records of personal work on the part of their readers, and the discussions which they provoked showed that they aroused general interest.

An interval in the course of the sitting gave an opportunity for tea and conversation, and the meeting was then resumed and lasted until 6 o'clock. The members who came from a distance were most hospitably entertained at a dinner in the evening by the local members of the Society and their friends, and that social gathering will undoubtedly help to strengthen the bonds and extend the bounds of the British Electrotherapeutic Society.

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ZINC ELECTROLYSIS.

By DAVID ARTHUR, M.D.

Owing to the researches of Leduc on the Continent, and the popularising of his work in this country by Dr. Lewis Jones, the methods of electrolytic medication have made rapid strides of late, and promise to become highly valuable in the treatment of disease, both to alleviate pain and to eradicate some of the most serious diseases that flesh is heir to.

In localised diseases drugs can be applied directly to the affected parts by electrolysis, whereas when given by the mouth they are diffused through the whole body, although the part to be influenced may be only a ten thousandth part of the whole. Almost any medicine can be given in this way, and its physiological action can thus be produced. In the case of animals even poisons have been administered by the electrolytic method in such doses as to produce death.

Great as the above advantages are, electrolysis as a means of obtaining the effect of drugs would never displace ordinary means of administering medicine, were it not able to do something that the other methods cannot do, and it is only in such cases that I now propose to speak.

The electrolysis which I am about to describe differs from Massey's methods, in which large doses of 200 milli-ampères are given for long periods, under general anæsthesia, the tissues being destroyed and the parts necrosed.

In this paper I shall confine myself to zinc electrolysis by galvanic currents only, and omit all reference to the method of introducing drugs by static electricity. One advantage of zinc electrolysis lies in the simplicity of the apparatus required, for there are many members of the profession shy of any form of electrical treatment, owing to the great expense of the apparatus required for much of it. In this case the expense is very small, for a few ordinary Leclanche cells can do all that is required. Expensive plant always encourages unqualified practice, the patients being more readily impressed by the sight of expensive apparatus than by appreciation of the ability of the practitioner.

To simplify electrolysis, beginners would do well to perform the following simple experiment: Dissolve a little sulphate of copper in gelatine to produce a faint blue colour, cut it up in pieces about the size of a lucifer match, and place the terminals of the battery at the extremities. Turn on the current, and gradually the region near the negative pole becomes a darker blue, and the positive much lighter, and by continuing the current long enough all the copper will be seen to be transported to the negative pole and all the SO_4 to the positive pole in the form of sulphuric acid, as indicated

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by the colour changes. This shows that there is a double movement, a procession of the SO_4 particles, or ions, to the positive pole, and of copper particles, or ions, to the negative pole, every ion carrying its appropriate + or − charge. By placing a galvanometer in the circuit the amount of ions brought to each pole can be calculated.

With chloride of zinc solutions a similar reaction takes place. The zinc ions are transported from the positive pole towards the negative, and the chlorine ions from the negative towards the positive, the free chlorine acts on the metallic zinc which forms the positive pole, to generate a fresh supply of zinc chloride.

Some forms of electrodes made of zinc wire are shown here. Before use they are covered with lint, moistened with a two per cent. solution of chloride of zinc. If a rodent ulcer is to be treated, the electrode is made as near to the size and shape of the ulcer as possible or perhaps a little larger ; if the ulcer is scabbed over remove the scab by previous treatment, so as to get the surface of the ulcer as homogeneous as possible.

In applying the current begin at zero, and do not lift off the electrode before the current has again been brought back to zero. This is important, for it prevents your patient from receiving a shock; by neglecting this advice I lost one of my patients, for he never came back again.

Regarding dosage, I give fully two 2 milliampères per square centimetre of surface for a period of about fifteen minutes, as recommended by Leduc. If the patients are nervous or complain of much pain one can make a preliminary application of a little cocaine by means of a separate electrode. At the end of the application, the ulcer has a pearly white appearance, due to zinc ions having penetrated the tissues in their effort to reach the negative pole. A considerable reaction follows and the part looks angry for a few days, necessitating some simple soothing ointment. If the ulcer has not completely healed, in ten days or so, the remaining part may be again treated in a like manner ; but not until after the lapse of a fortnight or three weeks.

The indifferent pole is composed of a large electrode well saturated with salt and water and placed on the nape of neck.

Four cases of rodent ulcer have been treated under my observation ; they were all situated on the face.

Case 1.—Had two X-ray applications before the zinc electrolysis, the ulcer healed up in fourteen days after the first application. Eight months afterwards there was no sign of return.

Case 2.—Had two applications with a fortnight's interval between. This case healed within a week of the second application, and since healing, eight months ago, there has been no return.

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Case 3.—This was the case of a man, aged 74, with a large rodent ulcer at the side of the nose, and an irregular extension almost to the inner canthus of left eye. He had been treated with X-rays without improvement. The first application of zinc electrolysis healed the greater part of the ulcer, with the exception of the extension. Three weeks later a second application was made, the extension became much smaller, and the granulations looked much healthier. The third application was made three weeks later, and the ulcer is now healed over, but looked red and unsatisfactory, and two months later it still looked red, but remained healed.

Case 4.—A middle-aged woman with a small ulcer of the size of a pea in left cheek, with one application; this ulcer healed up in about a fortnight. It is now five months ago and there is no return of the disease.

Thus, of the four cases, three have done remarkably well, and one *(Case 3)* though at present healed, shows signs of return.

My experience with zinc electrolysis is not limited to rodent ulcer. It is also useful in clearing up the granulations found in chronic pharyngitis, and the results in my opinion are much better than those given by the electric cautery. Also in cases of hypertrophic rhinitis, electrolysis apparently reduces permanently the distension of the erectile tissue over the inferior turbonated bone. It has given great relief in two cases of ozæna, taking away the offensive odour and the withered appearance of the affected mucous membrane.

Zinc electrolysis is so vastly inferior to X-rays in the treatment of large tuberculous ulcers that I have only used it in one case; and in lupus for clearing up any small nodules left after treatment by the X-rays I have found Finsen's light more efficacious.

In all those uterine cases which I formerly curetted, with the exception of retained fragments of placenta, I now use zinc electrolysis. It arrests hæmorrhage at the menopause like a charm, and excellent results are obtained in cases of endometritis and fibro myoma. A zinc bougie electrode, such as shown, covered with lint moistened with chloride of zinc, is passed inside the uterus; the indifferent electrode is placed for half the period of application over the abdomen, and for the other half over the back, so as to distribute the current all over the interior of the uterus.

For many years past I have extensively employed iodine electrolysis in rheumatic and gouty affections with good results, but this is apart from the subject of zinc electrolysis, and I shall therefore postpone any further remarks upon it.

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A CASE OF RODENT ULCER TREATED BY ZINC ELECTROLYSIS.

By HERBERT P. TAYLER, M.B.

I wish to bring forward the following case of rodent ulcer, which I have had under my care.

In November, 1901, I was asked by a spinster, aged 44 years, to examine her right cheek. I found an oblong thickening, having a nodulated edge, which raised it above the surrounding skin; it was freely movable on the subcutaneous tissue, and could be pinched up between the finger and thumb. It measured 7 millimetres by 16. There were no glands to be felt in the neck, and no ulcerated surface at that time.

I considered it to be the early stage of a rodent ulcer, and recommended its removal by operation. This was refused both by the patient and her mother, because a twin sister of the patient had died some eighteen years ago from recurrence after an operation for the removal of a mammary carcinoma, and no treatment was adopted, until fourteen months later, when I was asked by the patient to apply X-rays, the use of which in cancer cases was being much boomed by a halfpenny newspaper at that period.

As I had heard much about X-ray burns, and but little about their active beneficial effects, I rather feared them and suggested the use of static applications. This was agreed to, and I commenced treatment with the effluve from a blunt point connected with a Wimshurst machine with four 36-inch plates. This point was connected to the positive pole and it was placed as near the patient as possible without sparking, the patient and the negative pole being connected to earth.

At this time the growth had not increased in size, but had broken down in the centre forming a small ulcer, and the result of the static treatment was to reduce the indurated base of the growth, and after six months only a small patch was left and the ulcer had nearly, but not quite, healed. For a month during the summer there was a cessation of the treatment and the growth increased and the ulcer spread. Treatment was resumed in September and continued until December, in all about eighty sittings, with the effect of making the thickening melt away to a considerable extent. It had kept the growth from spreading, but had not really made the ulcer heal.

In December, 1902, treatment was begun with X-rays and continued until July, 1903, in all fifty-six sittings. This prevented the ulcer from spreading but did not cause it to heal.

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From this time until January 19th, 1904, there was a cessation of treatment owing to a general failure of the patient's health preventing her from attending. Then the treatment was begun with bromide of radium. A tube containing 5 milligrammes of radium bromide, being fixed in a leaden funnel, the size of the ulcer, and held so as to radiate on the ulcer, which was now almost circular and 12 millimetres in diameter. The radium was at first applied for fifteen minutes daily, then for twenty-five minutes every other day, and later for ten minutes four times a day.

At first this treatment made the ulcer so nearly heal that it was only 7 millimetres in diameter, but then the effect seemed to cease and the ulcer spread, until at the end of July it measured 30 millimetres by 12, and in October the patient got tired and treatment ceased.

Nothing was then done beyond prescribing antiseptic lotions until June, 1905, when Dr. Lewis Jones mentioned to me the advantage of electrolysis, using a zinc electrode. Treatment was begun on June 3rd by passing a current of 15 milliampères through a zinc electrode placed on a pad of lint soaked in a one per cent. solution of zinc chloride for twenty minutes.

The ulcer now measured 41 millimetres by 20. Its floor was yellow and unhealthy, its edges were hard, raised, and nodulated. The immediate result of the application was to make the surface of the ulcer look grey, but in a week's time the whole surface looked cleaner and more healthy, while the edge seemed less raised, and for a third part of the inner side it was level with the skin, and at this part it showed a healing line.

On June 27th, on July 4th and 18th, and on August 1st and 14th there were further sittings, the result of which was to thin out the edges, leaving only a nodule where the lobe of the ear joins the face, and four nodules at the lower end of the ulcer.

As the patient could not bear the pain the current strength was reduced to 8 milliampères. Owing to the fatal illness of patient's mother all treatment was stopped from August until December, when treatment by zinc electrolysis was again started, the size of the ulcer being as in June, but with thinned edges.

From December to April there were fifteen sittings, but the plan of treatment was altered. The current strength was fixed by what the patient could easily bear, usually 3 to 5 milliampères. Twenty minutes was taken as the standard length of time, but this was cut short if the patient showed signs of distress.

By the middle of February that third of the inner edge, which in the previous August had first shown improvement, had pushed its healing line across to join the other side,

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dividing the ulcer into two, separated by a spreading line of healed scar tissue. This necessitated using two different electrodes and treating each ulcer alternately.

By April 14th the whole was healed, with the exception of a circular ulcer less than 2 millimetres in diameter, over which there was a scab; the scar tissue was smooth and soft, and the only other evidence of disease was a nodule about 8 millimetres in diameter, and raised about 1 millimetre above the surface just behind the lobe of the ear, and three nodules where the lower edge of the ulcer had been.

As this scab had not come away, on June 1st there was an application over the lower nodules and the ulcer 2 milliampères for fifteen minutes. This was repeated on June 23rd and caused the nodules to become much softer.

At present all is firmly healed, these nodules, however, still remaining. The influence of the static breeze, of the X-rays, and of the radium was to hinder the progress of the disease, and in the case of the radium to produce a healing which was almost complete at one time but soon broke down again.

The zinc treatment caused a steady improvement from the first. In all, there were twenty-one sittings with a total of 362 minutes. There are one or two points which may be helpful to others. The first electrode was cut with a fret saw from zinc plate to fit the shape and size of the ulcer. Roofing zinc, which can be cut to shape with strong scissors, is equally good and much easier to manage. The surface of the electrode should be cleaned with fine emery cloth before each sitting. On two occasions when this was not done the result was not so satisfactory.

The strength of the solution of zinc chloride used to wet the pad over the ulcer may certainly be two per cent. without harm. The zinc electrode is connected to the positive terminal of the battery, and perhaps it is unnecessary to say that the larger the indifferent electrode is the greater the comfort of the patient.

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CATAPHORESIS IN MALIGNANT GROWTHS.

By Dr. F. O. MARSH,

Professor of Chemistry in the Miami Medical College, Cincinnati, Ohio.

The modern method of destroying malignant growths by means of cataphoresis is not to be confounded with the Apostoli method of treating fibroid tumours of the uterus. Cataphoresis, anaphoresis, or simply phoresis, are terms in medical and surgical parlance expressing what is known in the modern physics as the migration of ions, and signifying more than the older and more familiar term electrolysis. Electrolysis, pure and simple, means merely electric decomposition. Cataphoresis takes note of the attendant movement of the ions or electric units into which chemical compounds are decomposed, and their disposition in the medium surrounding the electrodes; their velocity of migration, etc., all have been studied to practical surgical account.

The full surgical use of cataphoresis, the writer is convinced, should not be confounded in value with the fashion in vogue some years ago of attempting to force drugs through the skin for general or local absorption by means of the constant current. Owing to the comparatively feeble currents used, there is every reason to believe that the results attained were more often imaginary than real. Often the results claimed were entirely visionary and founded on misconception. The idea of driving iodine, as such, through the skin by the application of the negative pole is quite a delusion.

True it is that, after a sufficient time, with enough current, the iodine disappears, but it has simply entered the skin as sodium iodide. The writer has repeatedly demonstrated that by causing the vapour of chlorine gas to impinge upon an artificial conducting medium, after stopping the current, the iodine cloud develops at once, revealing its exact position.

In the ordinary operations of electrolysis with which we are familiar an effort is made to select electrodes which resist chemical attack, as gold, platinum, or iridium.

The modern surgical cataphoric operation is done with a positive electrode of zinc amalgamated with mercury purposely selected with a view to the development of the chlorides or oxychlorides of zinc and mercury and their diffusion through the surrounding tissues.

A major operation of this kind is done as follows:

The 110-volt direct Edison current, or a current of similar strength from a sufficient number (about sixty) battery cells is employed. An efficient controller must be inserted in the circuit best of the graphite type for turning the current on and off very gradually, without shock to the patient.

A milliampèremeter capable of registering a 1,000 or 1,500 milliampères should be in the same circuit with the patient for keeping track of the current strength employed. The patient having been thoroughly anæsthetised, is laid with

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his back upon a broad clay pad, which should be large enough to cover the whole back and even extend down under the buttocks and under surface of the thighs. The clay electrode, soaked in warm water to increase conductivity, is in immediate and intimate contact with the skin, the lower surface being also in contact with the negative plate of sheet lead.

The positive pole is connected by a leash with three or four amalgamated zinc points, which are thrust into the substance of the growth to be destroyed.

The current is then turned on very gradually till the milliampèremeter indicates a current of 150 to 250 milliampères to each point, the total current rising to a strength of 700 or 800 milliampères or more. Of course, care and circumspection must be used in the neighbourhood of important nerve trunks, the phrenic, pneumogastric, etc.

By the cataphoric diffusion of the zinc and mercury salts the growth is gradually devitalised and converted into an odourless eschar, which subsequently separates.

The writer has long been impressed with the possible advantages of this method of treating malignant growths which originated in the hands of Dr. Massey, of Philadelphia.

During a recent visit to the American Oncologic Hospital of Philadelphia, incorporated and put in operation within the last few months, for the treatment of cancer and tumours in general, my previous conceptions as to the value of this procedure were amply justified.

In this institution the cataphoric operation is in frequent use and gives excellent results. The advantages which can be fairly claimed are these:

1. It is a bloodless operation, which is a minor consideration, but one worth taking into account.

2. There is no effusion of lymph or creation of fresh surface during the operation. If there is any foundation for the growing feeling among surgeons that there lurks a possible danger in these operations of accidental reimplantation of cancer cells, this is a matter of prime importance.

It is, perhaps, not superfluous to call attention to the fact that according to such a conception the ordinary asepsis against bacterial invasion constitutes no barrier to cancerous reinfection, but may even facilitate it, as in the case of a successful skin graft, where asepsis favours cell preservation. In other words, is it possible that surgical care may promote the transplantation of morbid epithelium when it is not expected and not wanted?

These considerations, together with the actual results, indicate that the danger of recurrence is diminished.

A noticeable fact is the absence of pain after the operation and the absence of odour in the eschars, one of the most objectionable and repulsive features of handling these cases being thus removed.

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ON THE ACTION OF RÖNTGEN RAYS UPON THE NERVOUS SYSTEM.

By C. COLOMBO,
Professor of Physical Therapeutics in the Royal University of Rome.

From the first days of X-rays radiologists have remarked that nervous disturbances might be occasioned by exposures to the radiations of the Crookes's tube, and they attributed the phenomena to most dissimilar agencies.

Some traced them to the oscillating electric field surrounding the Crookes' tube especially when that was a hard one; others to cathode rays coming through the walls of the tube, or to a specific action of the Röntgen rays proper; others, finally, to extraneous causes, as the uncomfortable position of the patient during the radiographic poses, which at that time were very long.

The phenomena recorded were nausea, headaches, delirium at night, cramps, anæsthesia, abortion, and sometimes paresis and paralysis of the limbs occurring when patients had been long exposed to the X-rays.

Confronted with phenomena of such gravity scientists sought an explanation from experiment, and many animals were sacrificed to this end.

Rodev and Bertin-Sans were able to provoke cramps, paralysis, and death in fourteen days, in the case of small animals exposed to the X-rays, and on examining them after death they found meningo-myelitic alterations through all the regions of the spinal marrow irradiated, also cellular hyperplasia and even some small hæmorrhages. These were not likely to have been of septic origin, because the bacteriological examination of the blood, of the cerebro-spinal fluid, and of the spinal cord gave negative results.

Futassy reported cases of paresis of the extremities followed by death in small guinea pigs and rabbits that he had subjected to Röntgen irradiation. Oudin, Barthelemy, Darier, and Ogus have also noted cases of paraplegia in small animals. Kienbock found analogous phenomena in the case of rats, but he did not get the same results wtih guinea pigs. Scholtz, too, in one case observed paralysis in a rabbit exposed to the X-rays. Ficinisky, in the case of guinea pigs, found degeneration of the lateral columns and of the gray matter in the posterior cornua of the cord. Finally, Danijsz found lesions of the nervous system in animals, exposed to radio-active substances.

On the basis of these experiments new observations were made on human beings. Out of the large number of these I wish to refer to the following case of Bertoletti, which is very conclusive, as it has analogy with one I propose to report.

It is the case of a man affected with *ulcus rodens* of the right fronto-parietal region, who, even before signs of any

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cutaneous reaction appeared, was suddenly seized with violent headache, nausea, vertigo, inequality of the pupil, and various symptoms of meningeal irritation, which passed away, but reappeared immediately upon the resumption of the X-ray treatment. Bertoletti concluded that there was an active influence of the X-rays upon the nervous centres and upon the meninges, which was confirmed upon examination of the cerebro-spinal fluid liquid, on the subject of which he is specially qualified to write with authority.

The active and immediate action of the Röntgen rays upon the nervous system being thus indicated, medical men have attempted to utilise it for the cure of diseases of the nervous system.

The sedative action of the X-rays on pain seems undeniable. Neuralgias and neuritis have been relieved and even cured by irradiations from Crookes's tube, by Pusey, Cederholm, Guilleminot, Albert-Weil, Bloch, Leonard, Gramegna, and by Darier with radium.

But it would seem we may even count upon a therapeutic action on the nervous centres. At the Salpêtrière Raymond claims to have cured two cases of syringomielia by irradiating the spinal marrow at the right level. Pescarolo and Gramegna obtained the same result in two cases of syringomielia and in two intra-rachidian tumours. Brauth claims to have succeeded in cases of epilepsy, Beck in Basedow's diseases, Raymond and Zimmern in spinal tabes.

The case I am about to adduce seems to illustrate the action of Röntgen rays upon the central nervous system, though in a manner somewhat different from that hitherto observed by other writers on the subject.

Signora A. T., 36 years old, of Massa Marittima, married, with three children. The family history reveals neurotic tendencies, and the patient shows all the signs of hysterical tendencies. As a young girl and a young woman she had frequent attacks of typical hysterical convulsions. Later on, although free from convulsive attacks, she was constantly in a state of nervous excitability.

In consequence of a sedentary life and poor abdominal circulation, a condition of marked varicose veins of the lower limbs developed, especially in the left leg. The limb became swelled, hard, and covered with large brown stains, and after her last confinement in 1900 she developed an acute phlebitis, with high fever and much pain. When the acute phlebitis had subsided, there remained a varicose condition, both in the superficial and deep vessels, affecting both the venous and lymphatic systems, with infiltration into the tissues of the leg, œdema, pigmentation, and serious muscular weakness, so that the patient could walk but little. Eventually varicose ulcers formed on the inner side of the left leg. These were

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very painful, and after she had attempted every variety of medical treatment for about five years she took the advice of a surgeon and had an operation for the removal of some of the veins, after which she seemed for the moment to be cured. But after a few months the trouble returned; the leg reassumed its former appearance, and a large ulcer formed on the inner part of the left leg near the middle of the tibia, measuring 24 mm. transversely and 40 mm. longitudinally. The base of the ulcer was unhealthy, with indented sloping edges.

In this condition the patient consulted me, and I did not hesitate to recommend mild applications of massage and some appropriate active and passive gymnastic exercises, with a view to stimulate the circulation in the limb. I thought it would also be good to add some applications of Röntgen rays, with the hope of exercising a direct influence towards the healing of the ulcer and to relieve the pain, as the radiotherapy of varicose ulcers is now admitted to be of indisputable efficacy. The irradiation was limited to the ulcerated surface, all the healthy skin round it being protected by a shield.

The apparatus I use for the production of Röntgen rays is one of the most perfect and such as to preclude any error in the estimation, either of the degree of penetration of the rays used or of the quantity of rays projected upon the part under treatment at each sitting, with the certainty that the rays were exactly located within the prescribed limits. The patient was treated by fractional doses.

It is well known that there is a group of radiologists, especially French, with Beclère at their head, who hold the dose in mass to be the best method. To the part indicated they administer at once the largest dose of X-rays recognised as compatible with the integrity of the cutaneous tissues, and between one application and another they leave a sufficient interval (a week) to prevent the accumulation of the successive doses.

But in the case before us, although there was no danger of injuring the skin, as it was already ulcerated, we preferred fractional doses because we felt the need of watching the local and general reaction of the X-rays in so sensitive a patient, and the necessity of not exhausting a subject of little physical resistance by means of long and wearying sittings.

The patient was placed on the couch and the cylindrical tube of the Belot localiser No. 2 of 40 mms. diameter was applied to the ulcerated area. The length of the localising tube was such that the distance of the bottom of the ulcer from the centre of the anticathode was exactly 15 cms. The Crookes's tube was regulated so that its hardness should constantly correspond with 6 degrees Benoist. The quantity of rays administered at every application corresponded to 2 units H., and the sittings were made at intervals of three days. When a total quantity of 12-13 units H. was reached,

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a longer interval of rest was given. Altogether 40 H. were administered in fifty-eight days, which gives an average of about two thirds H. each day.

Considering, however, that the final effect of a dose of X-rays administered by fractions corresponds to the final effect of the dose in mass diminished by one-fourth, (Belot), the total dose administered by us is reduced to an effective dose of 30 H., or to an average on one-half H. per day.

As is seen, it is a matter of very small doses, inferior to the average dose in ordinary use, not for ulcerated skin but for whole tissues.

The treatment began on the 27th February, 1906. At the beginning the patient bore the treatment fairly well; and on the 13th March, 1906—that is, after fifteen days' treatment, having received in five applications a quantity of X-rays corresponding to about 10 H.—the ulcer was observed to be less deep, with its surface smoother, with less secretion, and with the edges disposed to heal.

The dimensions of the ulcer were also reduced—the longitudinal diameter measuring 36 mms. and the transverse 21 mms. The œdema of the leg was less pronounced, and the hardness of the limb were yielding under the action of the massage and the passive and active exercise.

To avoid any possibility of too lively a reaction, at this point I increased the interval between the X-ray applications, continuing, however, the massage and exercises.

On the 20th March the X-rays were resumed, and on the 26th March, after two more applications, in which about 4 H. were administered, the patient was seized with serious hysterical convulsions, which she had not had for a long time, and which were repeated for three consecutive nights, accompanied by an indescribable condition of nervous agitation. The X-rays were stopped, and the case was treated on general principles, the ulcer being dressed with oxide of zinc paste and with sedatives.

On the 30th March, as the patient was restored and we did not think there could be any relation between the X-rays and the nervous manifestations, the sittings were resumed, but the following night she had still more violent convulsions. There was another suspension of the rays during which we observed that the local conditions of the ulcer were further improving.

On the 4th April the X-rays were resumed, under the conditions before described, but from that day the lady complained of severe pains radiating from the ulcer and traversing her whole body, producing in her a condition of extreme agitation and hindering her sleep.

All the same, as I had faith in the success of my treatment, I continued, but on the 29th April the patient could no longer

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endure the burning and gnawing pain which extended from the ulcer all over her body, the nervous agitation that had mastered her, and the insomnia; and she definitely suspended the radiotherapy.

The nervous condition of the patient became continually worse. There were almost continuous convulsions and sleeplessness, and there was reason to fear for her sanity; but a threat of confinement in an asylum had a good effect upon her, and the disquieting symptoms diminished gradually, and early in June the patient was able to return home in moderate health. Of the ulceration I have not been able to learn anything more, but it is probable it has continued healing.

The nervous phenomena in this case appeared suddenly, and without apparent cause other than the radiotherapic treatment, and followed a course parallel with the administration of the Röntgen rays, becoming weaker whenever the application was suspended, and gradually assuming more serious proportions with the accumulation of the successive doses of X-rays. For these reasons we may consider the cause of the nervous disturbances to have been the X-ray applications.

We have already seen that various writers have proved that the Röntgen rays—applied directly to the nerve centres of animals or man—produce undoubted functional and anatomical alterations, even when the cutaneous surfaces traversed by the rays are unaffected. But all these authors have irradiated the nervous centres directly, and the action obtained by them is more easily understood, while, in the present case, the irradiation was directed upon a remote part of the cutaneous surface, and we may enquire how the action of the X-rays can have been felt in the nervous centres, although not applied to them, and we may fall back upon Kienbock's theory, according to which disturbances of the organism may be due to the absorption of toxins produced by the Röntgen rays upon the tissues in general.

But such an interpretation is not manifestly applicable in this case, as there was no fever, and because the area irradiated was so extremely limited as to render it improbable that it could produce the quantity of toxin necessary to occasion serious phenomena.

The following explanation remains, namely, that the X-rays, though acting locally upon the ulcer, also indirectly stimulated the sensitive nerve terminations, and so influenced the spinal marrow and the cerebral cortex, which already constituted the points of least resistance in a neuropathic individual; and we may regard the action of the Röntgen rays in the light of an occasional cause, producing, by reflex action, an outbreak of the nervous phenomena, to which the patient was already predisposed by the constitutional weakness of her nervous centres.

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NOTES AND ABSTRACTS.

Röntgen Therapy of Epithelioma of the lip.—G. H. Stover considers that Röntgen therapy is not applicable to all epitheliomata of the lip. If there is a large tumour mass and its appearance is such that extension of infection is imminent it is probably best to employ surgical measures at once. In cases in which the original lesion is not so threatening, yet with enlarged or indurated glands in the neighbourhood, a thorough surgical operation should probably be advised.

The use of fluorescin, as suggested by Morton, seems a useful procedure, and his results have been somewhat better since beginning its use, but the cases are not yet old enough to report.

The border-line cases, meaning those in which it is somewhat of a debatable question whether to use the Röntgen ray or to advise surgical intervention, may be treated for a time in the hope of avoiding an operation, with the risks attendant upon all administrations of anæsthetics, and with a possible or probable resulting disfigurement. At the present time there are operations which enable a safe amount of tissue to be removed, yet with a minimum of disfigurement. If favourable action by the Röntgen ray is not soon manifest in these border-line cases they should be submitted to operation; the preliminary raying will not have done harm, but will have been of benefit.

Those cases in which the disease is superficial, not great in extent, and in which there is no glandular involvement should certainly receive the Röntgen ray, and a recovery may be confidently expected in a very large majority of them.

He uses no local application as a routine in the treatment of epithelioma, and thinks that it is rather an advantage than otherwise for a crust to form on the surface of an epithelioma.

He does not aim to produce a dermatitis, but if an erythem a appears, accepts it as evidence that full action is taking tplace, and usually lessens the frequency of the applicaion.

Stover does not as yet feel able to express an opinion regairding the value of post-operative raying as a prophylactic aganst recurrence; it seems to be a rational procedure. If the lip has been excised and a recurrence appears he would certainly use the ray very patiently before advising another resort to surgery.

He concludes that X-rays are most useful in the treatment of this disease, and adduces a number of cases in which favourable results have been obtained.—*Journal of Advanced Therapeutics*, No. 3, 1906.

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Two cases have recently been before the Assize Courts which are of peculiar interest to members of this Society. We therefore append somewhat lengthy reports, abstracted from the *British Medical Journal*, of August 11th and 18th. "Dr." Bodie is well known to us all by repute and his performances may have given some of us half an hour's amusement, especially his method of "application" of high frequency currents —a form of electricity which lends itself to stage effects. Mr. Justice Grantham's remarks upon quackery unfortunately reproduce too well the opinions of the general public.

The result in the second trial is satisfactory, since it is difficult to obtain a conviction in such cases.

At the West Riding Assizes on August 1st an action for slander was tried by Mr. Justice Grantham, the defendants being Mr. and Mrs. Hudson, of Weetwood Mount, Far Headingley, Leeds, from whom damages of £100 were claimed. Mrs. Hudson, a lady who has been a member of the Educational Committee of Leeds, and does much philanthropic work in the city, made the remarks alleged to be slanderous in addressing, by request, the annual meeting of the Leeds Invalid Children's Aid Society. The plaintiff was the man Bodie, whose conviction for breaches of the Children's Employment Act in Bradford was recorded in these columns on July 28th. Both parties were represented by King's Counsel, aided by juniors. Bodie was described by his counsel on this occasion, according to the *Yorkshire Daily Observer,* as a gentleman of some property residing at the Manor House, Macduff, N.B., and as having the qualification of M.D., C.M., of the United States of America. Similarly he was stated to carry on the business and profession of a lecturer on electricity and its uses as applied to cripples and people suffering from paralysis. Whether the degrees that plaintiff held were of any great validity was a matter of indifference in this case. The plaintiff's plan was to advertise in the newspapers of the towns which he intended to visit, asking people to bring crippled children who had been declared incurable by the medical faculty; those children appeared on the stage of the music hall, and were subjected by plaintiff to his treatment. As for the results, these, he was told, were in some cases absolutely startling. Cases had been verified in which people who had been treated as incurable and discharged from hospital had absolutely walked off the stage after the treatment. Many would think this was incredible, and that the plaintiff was a quack, but probably the plaintiff would not mind that so long as he had the satisfaction of doing good work. He charged nothing for his treatment or for the presence of the children or persons who appeared on the stage.

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The statement made at the meeting of the Invalid Children's Aid Society, and alleged to be slanderous, was as follows:

"The Committee was very sorry that some of their children had been taken to the Tivoli in connection with a certain show, and that some of the irons with which the Committee had provided them had been exhibited as cruel things. The man had paid the parents 2*s.* a night to go there, but the parents had since been admonished. He said he had cured one child, but as a matter of fact it had never been in his hands."

The plaintiff brought the action to refute the truth of these statements, not, said counsel, because he wanted money, but in order to establish his character. He could not appear in court himself, because he was under a penalty of £300 to appear at Dundee that night, but his manager was present to give evidence.

The plaintiff's manager, in giving evidence, said that the children were selected from the cases which attended, and arrangements were made for the exhibition of others who had previously been cured. The children came of their own accord, and nothing was paid either to them or their parents for attending, or by them or for them for their treatment. The plaintiff received from fifty to fifty-five per cent. of the receipts of the music hall. He had himself seen hundreds of cases cured, and the plaintiff never claimed to have cured any case which had not been under his care. When a new case was introduced the patient was carried on to the stage or allowed to walk on with a crutch. Any supports worn were then taken away, adhesions were broken down, and electricity applied. Then in about five minutes the patient was able to get up and walk off the stage without assistance. It was true that one woman alleged to have been cured had died three days later of "overjoy and exertion."

Two women of the working class gave evidence as to children of theirs having ceased to need crutches or supports after being treated by the plaintiff. An objection to this evidence being received was raised on the ground that the plaintiff's general work was not under consideration, but it was overruled.

The case for the defence was then opened, counsel stating that he relied on the occasion on which the words complained of were uttered being privileged. As for the alleged slander, the words were spoken in reference to the plaintiff's pretensions as a doctor, but his business was admittedly that of a showman, and in respect of his qualifications and work in that respect the defendant said nothing.

Evidence was then given by the nurse engaged at the School for Crippled Children provided by the Leeds Educa-

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tion Authority, and in the work of which the Invalid Children's Aid Society takes part. One of her children having absented herself in March, this year, she made inquiries and went to the music hall at which the plaintiff was performing. She there saw two of her children paraded on the stage as cases which had previously been cured; one of them the showman Bodie stated had been discharged from the Infirmary as incurable, but now she required no supports and her crutches had been chopped up. He did not state that others had had to be provided for her. She did not know that the child had been to Bodie at his previous visit last year. The children stumbled off the stage and one of them had again been sent to the Infirmary.

Mrs. Hudson said that some headings for remarks in moving a vote of thanks at the annual meeting of the Society were given her, and one of them had reference to Bodie. On the previous day, when visiting the school, she had learned from the nurse about the children appearing on the stage; she understood they had never been treated by the plaintiff at all, and that the parents had been paid for their appearance; though she could not remember precisely what she had said in her speech she had no thought of injuring the plaintiff in his business if he had any, but merely wished the supporters of the Society, whom she believed she was alone addressing, to know that they were doing everything they could to relieve the children in their charge.

Mr. H. Littlewood, one of the surgeons of the Leeds Infirmary, said the child shown on the stage as having been cured was under his treatment in 1903 and 1904 for hip disease. The child came again to him in April last year, after Bodie's visit, a fresh abscess having formed as the child had abandoned its crutches. He did not ask who had suggested her doing so, but told her she was not fit yet to do without them. He operated again, new crutches were provided, and, after a long stay in the convalescent home, she got comparatively well again. So far as hip-joint disease was concerned electricity was useless.

Mr. Justice Grantham, in summing up, ruled that the occasion in which the statements were uttered could not be regarded as privileged, as the meeting was advertised. They had therefore to consider if the statements were true. They were made on the strength of something which Mrs. Hudson heard from the nurse, and this turned out to be untrue in parts, and in effect the plaintiff was accused of being a rank impostor. But was he one? His methods might be a shock to some people, and it might be better if he did his work in some other way, so long as it was honest. Had any one a right to accuse him of lying and imposition? That he did a certain amount of good was beyond dispute. Doctors called

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these men quacks, but it was common knowledge that cures had been effected by other than medical men, and a well-known instance was that of a common cobbler who, working as a bonesetter, cured hundreds of cases the doctors had not been able to cure. It was done, no doubt, through his having a great knowledge of anatomy. An eminent doctor had told the Court that electricity was beneficial in certain cases, and they had had before them specific evidence of cases which had been cured. The plaintiff therefore could not fairly be described as an impostor.

After an absence of a few minutes the jury returned a verdict for the plaintiff with one farthing damages. Counsel for the defendants applied for a stay of execution and an order that each side should pay its own costs, but the Judge refused.

* * *

Albert Edward Richard, an electrical quack, was convicted at the Stafford Assizes last week of obtaining money by false pretences. He had been in the habit of travelling round the country giving so-called entertainments under the name of "Professor" Richard, at which he exhibited various electrical apparatus and claimed to be able to cure many sorts of chronic nervous affections, such as paralysis and deafness; he supplied his victims with appliances, including an "electric chair," for which he obtained considerable sums of money. The defence took the form of evidence from patients, who said that they had received benefit from the prisoner's treatment.

The jury retired at half-past 4 o'clock, and returned in ten minutes with a verdict of guilty.

Detective Lewis was called into the box, and he was proceeding to read a brief history of the career of the prisoner, but he had not gone far before the Judge stopped him and said that that was not what he wanted to know. From the little tha' was read by Lewis, it appeared that prisoner was born in Alsace in 1847, that he carried on a rag-dealing business at Antwerp in 1869; that he was married at that place in 1870, and divorced the same year; that he had suffered three months' imprisonment for complicity in robbery; that in 1872 he received two years' imprisonment at Antwerp for swindling; that in 1873 he was expelled from Belgium by royal decree; that his name was subsequently removed from the register of population at Wavre for misconduct; that he was again permitted to live in Belgium, but in 1876 was again expelled for misconduct; that in 1879 he was conducting a glove store in Louisville, America, and became bankrupt; that he married again, and soon after the marriage ceremony made an assignment to his creditors, the assets being a greatly-depleted stock of gloves.

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His Lordship, in sentencing the prisoner, said he had no doubt that it was a proper verdict. He regarded prisoner as a dangerous person, who obtained money from poor people which they could ill afford to spare. Prisoner had been doing this for a long time, and doing it successfully, and he had no doubt that his career before he came to England was a bad one. It was a perfectly proper prosecution, but he could not but say that he thought it might have been better managed. He had read certificates from medical men which had been handed to him, and he was satisfied that prisoner was not in good health, and that he was not in a condition to undergo hard labour. He hoped that by the exposure which had taken place an end would be put to prisoner's career in this country. A sentence of twelve months, without hard labour, was passed. The Judge refused an application for the case to be referred to the Court for Crown Cases Reserved, but he made an order for the expenses of the prisoner's witnesses to be paid out of the borough funds of the borough of Wolverhampton.

PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Provincial Meeting of the British Electrotherapeutic Society for 1906 was held on Friday, July 27th, at the Clifton Down Hotel, Bristol.

Present: Eighteen members and visitors.

Dr. H. LEWIS JONES in the Chair.

The minutes of the previous Meeting were read and confirmed, and the following gentlemen were duly elected members of the Society: Arthur Rupert Hallam, M.D.Edin.; Otto Juettner, M.D., Cincinnati, U.S.A.

Dr. H. P. TAYLER then took the Chair, while Dr. Lewis Jones read a paper on "Cervical Ribs and their Relation to Atrophy of the Intrinsic Muscles of the Hand." Lantern slides of radiograms from patients with cervical ribs were shown, some of them being cases of patients with atrophy of the intrinsic muscles of the hands, while others had not. Some slides of radiograms of cervical ribs, taken by Mr. A. D. Reid, were also shown.

Dr. H. P. TAYLER then read "Notes of a Case of Rodent Ulcer treated by Zinc Electrolysis," and this was followed by Dr. David Arthur's paper on "Zinc Electrolysis."

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Zinc electrodes of coiled wire and intra-uterine sound electrodes of zinc were exhibited.

Dr. LEWIS JONES, in opening the discussion, testified to the great use of zinc electrolysis. He used a five per cent. solution of sulphate of zinc in place of the chloride, as it could be used in stronger solutions without fear of caustic effects. It was necessary that pure solutions be employed; it was even well to avoid handling the wrapping of the electrode, so as to prevent foreign ions from obtaining access to the electrolyte. The results in rodent ulcer were most excellent, and he had treated fifteen or sixteen cases with complete success. In lupus his efforts had hitherto proved disappointing. This might be due to the fact that the body of the tubercle bacillus was largely composed of fatty materials, which tended to render the bacillus a non-conductor, and so protected it from the effects of the electrolysis.

Dr. DONALD BAYNES also spoke.

Dr. PRESTON KING then read a paper on "Static Electricity as an Aid to Recovery." With four years of experience he has seen excellent results in cases of nervous headache, brain fag, etc., from the use of the static breeze. When the patient is charged positively there is less lead than from the negative pole. Pain is relieved and consequently sleep is induced. He considered that static electricity offers the best prospect of improving neurasthenia of all forms of electric therapeutics.

In commenting, Dr. LEWIS JONES considered that there was marked difference in the way in which patients behaved to the static current. Some felt comfortable while others very restless and ill at ease. In his opinion it was a question of blood pressure. This is raised by the treatment, and those with low blood pressure obtained a sense of well being, while those of habitual high blood pressure experienced discomfort. Some asthmatics were relieved under the static breeze.

Dr. ELLIOTT spoke of the use of the static current in depression of the nervous system, particularly in that observed in syphilitics.

Drs. ARTHUR, TAYLER, and DONALD BAYNES also spoke.

Dr. KENNETH WILLS then read a paper on "X-rays in Medical Practice."

The CHAIRMAN testified to the use of X-rays in skin affections.

Dr. SHINGLETON SMITH, speaking from the standpoint of the general physician, had been much impressed by the results of X-ray treatment in certain cases of malignant diseases recently under his observation. They had been cases of recurrent disease after a surgical removal of the primary growth. In the one case, in which the right mamma had been removed, and a secondary growth invaded the left

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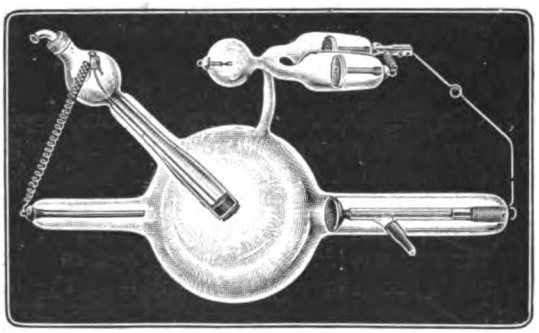
mamma and the left axillary glands, these glands and the growth in the mamma entirely disappeared under X-ray treatment: in due course the disease extended to the lungs and the abdomen, but, although the patient lived for many months, there was no return of the disease in the left mamma or its neighbourhood. In another case, after removal of the left breast, numerous secondary cutaneous nodules submitted to X-ray treatment cleared up entirely, as did also many glands on both sides of the neck. He had been so astonished at the way in which these secondary nodules and growths had disappeared that he ventured to suggest the heterodox remark that it might even be justifiable in some cases to postpone a surgical removal and give X-ray treatment a chance of causing atrophy in the primary growth.

Dr. MICHELL CLARKE spoke of the advantage to be obtained from the rays in diagnosing early tubercle, aneurysm of the descending aorta, and the therapeutic use in lymphadenoma. He recounted a case of a boy, with enlarged glands, in whom a diagnosis had been made of lymphadenoma, who always obtained extreme benefit from the rays from time to time, though the patient eventually died. Post-mortem adenomata of the liver and spleen were found, but the glands were not enlarged. The question of the permanence of the improvement obtained had not yet been sufficiently worked out.

Dr. STACK had found the rays useful in detecting foreign bodies in the eye; in revealing splits in the bones and splinters in bruised conditions, and the diagnosis of fractures in the os magnum in sprained wrists and in the tarsus in sprained ankles. Radiographs could be so manipulated as to produce very erroneous impressions of the condition present.

Dr. ARTHUR considered that with a "soft" tube more help can be found in aneurysm than with a "hard" one. He is in the habit of using a hard tube which, by pressing with a heavy discharge, will grow softer and softer. The effect upon the screen is seen to vary, and considerable information can thereby be obtained.



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MEDICAL

Electrology and Radiology.

No. 9. SEPTEMBER, 1906. Vol. VII.

RADIOTHERAPY OF TUBERCULOUS LYMPHATIC GLANDS.

The use of X-rays in the treatment of tuberculous lymphatic glands in the neck and elsewhere is a line of work deserving of more attention in this country. In 1905 Bergonié* reported a series of four cases with non-suppurating tuberculous glands, and stated that he considered the action of X-rays to be markedly good. All the glands treated became reduced in size, but did not disappear completely, while neighbouring glands protected from the action of the rays remained as before. He considered that the rays were most effective when a marked reaction was produced in the region treated. R. Desplats† has published a detailed account of two cases in which the same treatment was successful. He found by blood examinations that a change was produced of the same nature as that which occurs in the X-ray treatment of leukæmia. P. Redard‡ also has obtained good results in three cases with old standing, large and hard fibrous cervical glands. The tumours disappeared almost entirely, but a somewhat prolonged treatment was required. Applications were made about once a fortnight for six months. There was no inconvenience or general disturbance from the use of the rays. During the treatment the infiltration or œdema which surrounded the glands was first noticed to diminish. As it disappears the contours of the glands proper become more easily palpable, and Redard states that they become isolated from one another in the general cluster, so that they can be felt to roll beneath the fingers on palpation.

Glands beginning to soften seemed to be hastened to suppuration by the action of the rays, and although this may be advisable it is not yet certainly so.

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* *Archives d'Electricité médicale*, 1905, p. 300. (April 25th.)

† Ibid, p. 626.

‡ Ibid, p. 931.

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Five cases were treated in which suppurative processes with sinuses existed. In these at first the discharge increased, though the inflammation did not extend. Then the sinuses secreted for several days an abundant serous discharge, the glands decreased rapidly, the sinuses healed after about seven treatments, and the enlarged glands disappeared more completely than was the case with non-suppurating glands.

M. Dovaston* has reported a case in which a large mass of glands on one side of the neck disappeared under X-ray treatment, leaving a perfectly formed neck on that side. On the other side a surgical operation for the removal of a similar mass of glands had previously been performed. The X-ray treatment occupied nine months in all. M. Hendrix† has published notes of three successful cases, and notes that the first sign of improvement was a softening of the inflammatory tissue between the glands, so that their individual contours could be felt, just as was mentioned by Redard. Hendrix says that the larger glands leave behind them a kind of cicatricial residue, but the smaller ones disappear entirely, so far as palpation is able to determine this.

G. H. Stover‡ has reported a case with two enlarged glands, one suppurating, on the right side of the neck. The suppuration ceased under the X-ray and the other gland disappeared. Another case had had tubercular glands for several years. They had been opened and pus evacuated repeatedly. When she came under observation there was an immense mass on each side of the neck, extending from the lobe of the ear down into the shoulder and a mass under the jaw. She was treated steadily for one year, and nineteen months after the treatment was completed, an observer, standing a short distance away, would notice nothing abnormal. The third case, a boy, had tubercular glands on each side of the neck. He was a delicate-looking child, whose mother died from tuberculosis. He was treated for five months, at the end of which time no trouble was apparent, and he had gained considerable in weight. Twenty-one months after treatment he is well and a healthy-looking boy. Case number four was a girl of ten years, daughter of a tubercular mother. This patient had a number of tubercular glands on the right side of the neck. On the left were several enlarged glands, one of which was as large as a pigeon's egg. She is still under treatment. The gland on the right side has practically disappeared. The fifth case presented masses of large glands on each side of the neck

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* *Lancet,* February 10th, 1906.

† *La Polyclinique* (Brussels), June 15th, 1905. Abstract in *Lancet,* August 5th, 1905.

‡ *Journal of Advanced Therapeutics,* September, 1906.

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and under the jaw, under treatment at present; they have greatly reduced in size, and are now represented by hard lumps, composed probably mostly of fibrous tissue. The sixth case had scrofulous glands in both groins, a large and acutely inflamed one in the left axilla, a chain of quite small ones in the right side of neck, a lump the size of an almond in the right breast, and a number of quite large mesenteric glands could be palpated in the abdomen. She had suffered from diarrhœa for a long time and had daily rise of temperature and was not a very promising case. Fluorescin was used in conjunction with the X-ray. After fourteen treatments her fever disappeared, and after the nineteenth exposure her diarrhœa disappeared. After twenty-one administrations, the treatment was discontinued, and after her vacation, when she returned to the office, she was in better health than she had been for many years. The lump in the left breast was hard and only one-fourth its former size, and only traces of the glands in the axilla were found. The seventh case had occasional swellings of the glands of the neck for eight years. When she came for treatment there was a chain of large glands on each side of the neck and a number under the chin. After fifteen exposures all the glands in the neck were gone, and the others were smaller.

Journals Received.

American Journal of Progressive Therapeutics.
American Medicine.
Annales de Médecine et Chirurgie Infantiles.
Archives d'Electricité Médicale.
Archives of Physiological Therapy.
Bristol Medico-Chirurgical Journal.
Brooklyn Medical Journal.
Bulletin of the Nebraska College of Medicine.
Journal de Physiothérapie.
Journal of Abnormal Psychology.
Journal of Advanced Therapeutics.
Journal of Mental Pathology.
Le Radium.
Medical Record.
Medical Review of Reviews.
New York Medical Journal.
Revue de Cinésie.
Revue de Thérapeutique.
The Medical Council.

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CERVICAL RIBS AND THEIR RELATION TO ATROPHY OF THE INTRINSIC MUSCLES OF THE HAND.

By H. LEWIS JONES, M.D.,

Medical Officer in charge of the Electrical Department, St. Bartholomew's Hospital.

In the St. Bartholomew's Hospital Reports for 1893, I published a short paper on Symmetrical Atrophy affecting the hands in young people, and drew attention to a class of case which, so far as I am aware, had not previously been recognised. In that paper six cases were recorded, and these were also shown at a clinical meeting of the Neurological Society at about the same time. Since that date other observers have reported cases belonging to the same class, and in 1902 E. F. Buzzard,* in a paper on Uniradicular Palsies of the Brachial Plexus, assigned these cases to their proper place by showing that they should be regarded as due to an affection of the first dorsal nerve, and that an anæsthetic area corresponding to that nerve segment might often be found if looked for on the inner side of the forearm.

The symptoms of the condition may be concisely stated in the following extract from my paper of 1893:

"The ball of the thumb is noticed by the patient to be getting thin, and the movements of the thumb to be weak and awkward. There is a history of pain or tingling in the fingers, in the wrist, or in the arm and forearm; this usually comes on before the atrophy is noticed. The affected muscles become wasted, and some or all of them show a well-marked reaction of degeneration. The changes are not limited to muscles supplied by a single nerve-trunk, but are found both in median and ulnar muscles. Only the intrinsic muscles of the hand are affected. The cases do not go on to progressive muscular atrophy, and under treatment some of them have improved or recovered.

"From their resemblance to one another, both in the matter of age and sex, as well as in their history and symptoms, these cases seem to form a clinical group, and one meets with difficulties in trying to fit them in with either acute poliomyelitis or with progressive muscular atrophy, or with primary atrophy of muscles. From the latter they are separated by the occurrence of the reaction of degeneration, which is rarely or never found in primary or idiopathic muscular atrophy. The history is not that which is usual in infantile paralysis, and the non-progressive nature of the

* Brain, 1902, p. 299.

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symptoms opposes the idea of progressive muscular atrophy. I am disposed to regard them as due to neuritis, and as being essentially peripheral in their nature, but it is not easy to see why the neuritis should arise."

Since the year 1893, many important new discoveries and developments have arisen to occupy one's attention in the field of electrotherapeutics, but I have not ceased to take a special interest in all cases of wasting of the intrinsic muscles of the hands, and I have seen in all about twenty-five or thirty examples, the majority of them in young female patients.

Fresh interest in these cases has recently been evoked by a paper read by W. Thorburn, and subsequently printed in the transactions of the Medico-Chirurgical Society,* which contained the following significant paragraphs:

"Although cases of supernumerary cervical ribs are not very rare and are tolerably well recognised, my excuse for bringing the matter before you to-night lies in the fact that I have been unable to find any complete description of the clinical symptoms which they produce, and especially in the slight notice which they have attracted from neurologists. As illustrating the latter fact, we may note that in Duval and Guillain's Monograph upon the Brachial Plexus, the seventh cervical rib is not even mentioned, and that several cases of radicular paralysis of the plexus have been recently published in which this condition, although a probable cause of the symptoms met with, is not considered as an ætiological factor."

He then proceeds to describe two cases in which atrophy of the muscles of the hands was shown by skiagrams to be associated with the presence of cervical ribs, and points out that the cases present points of the closest similarity to certain examples of uniradicular paralysis of the brachial plexus published by Farquhar Buzzard and Edwin Bramwell, "in none of which was the pathology fully explained, and in none of which was the possible presence of a cervical rib specially excluded."

In consequence of that paper of Dr. Thorburn's, I proceeded to take X-ray photographs of such of my own cases as I could find. Unfortunately, alas! the search for old hospital patients in London is full of disappointments, and particularly so in the case of young women, many of whom change not only their addresses but also their names through marriage, consequently I have only been able to trace a minority of the cases of atrophy of the hands which I have seen.

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*The seventh cervical rib, and its effects upon the brachial plexus.—Trans. Med. Chi. Society. Vol. 88 (1905).

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The result of the X-ray examinations of these patients fully confirms Dr. Thorburn's opinion, that the cervical rib is an important factor in the causation of atrophy of the muscles of the hand, for well-marked cervical ribs were found to exist in ten out of the fourteen cases examined. Moreover, a rib was present on both sides in eight persons who presented atrophy of both hands, but only on one side, and that the one affected, in two cases with atrophy of one side only. Moreover, several of the patients have volunteered the statement that pressure in the neck over the site of the supernumerary rib produced a tingling sensation, which was felt on the inner side of the forearm and in the fingers.

A possible objection to the assumption that the cervical ribs and the muscular atrophy stand in the relation of cause and effect is the fact that many instances of cervical ribs have been recorded in individuals who presented no signs of muscular atrophy or any other interference with the cords of the brachial plexus, but it is manifest that the influence exercised by the rib upon the nerve-trunk must be a mechanical one, the rib causing pressure or stretching of the nerve-trunk, and thus one can readily understand that whereas some cervical ribs might interfere with the plexus by reason of their shape or position, others might be so disposed as to lie in a direction which kept them entirely clear of the brachial plexus. That a cervical rib may interfere with the cords of the plexus is made clear by the reports of dissectors. In the proceedings of the Anatomical Society of Great Britain and Ireland for May, 1900, there is a detailed account of the dissection of two cases of cervical rib by Dr. Llewellyn Phillips, formerly Demonstrator of Anatomy in St. Bartholomew's Hospital.—

In the first of the two cases the brachial plexus is stated to have been normally constituted; the lowest cord, formed of the eighth cervical and the first dorsal nerves, crossed over the cervical rib, grooving it. The body of the cervical rib was pointed in front and was connected with the upper end of the manubrium sterni by a fibrous band. In the other case also there was a groove on the upper surface of the ribs of both sides which was occupied by the brachial plexus, and on both sides the ribs ended in front in a rounded point, from which a fibrous band ran to the sternum. The brachial plexus was normally constituted; and, as in the first case, the lower cord formed by the eighth cervical and first dorsal nerves crossed over the seventh cervical rib and deeply grooved it.

Again, in July, 1892, in the proceedings of the same society, Dr. Addison is reported to have shown a specimen taken from a dissecting room subject, which presented a cervical rib on each side. The subject was a female,

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aged 56. The lowest cord of the brachial plexus grooved the upper surface of the supernumerary rib, and a fibrous cord was present on both sides in this individual also. No note is made of the condition of the hands in either of these patients, but this might naturally have been overlooked in the absence of any information tending to connect cervical ribs with muscular atrophy.

In one of my cases an operation for the removal of the cervical rib was performed by Mr. Rawling, who has informed me that the rib was much curved forwards, and was bony in its entire length, save for a short cap of cartilage at its anterior extremity. This was quite free, without ligaments or attachments. The rib was broad and flat and somewhat resembled a first dorsal rib, its inner border was very sharp, and it had a groove above for the eighth cervical nerve, which was sharply kinked over the anterior part of the rib. The first dorsal nerve passed under the rib and was also slightly displaced and pressed on. Both cords were of the usual size and united together a little beyond the rib.

Of the other four cases of patients presenting atrophy of the hands of apparently the same type, but in whom the existence of a cervical rib is not apparent, it is perhaps worthy of note that in two of these the seventh cervical vertebra is not quite normal so far as its transverse processes are concerned, and this raises the question as to what is the normal length and X-ray appearance of a seventh cervical transverse process. It is generally accepted by anatomists that the transverse processes of the seventh cervical are not so long as those of the first dorsal, and this is certainly the case in many normal individuals, but in others the X-ray photograph shows large transverse processes or even short rudiments of ribs. On this account, I find it difficult to assert that the four cases under consideration owe their muscular atrophy to the condition of their seventh cervical transverse processes, and prefer for the present to take up the firmer position that cervical ribs are present in a large majority of patients showing uniradicular atrophy of the intrinsic muscles of the hands, but that they are not the only cause of this form of neuritis.

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TWO CASES OF CHILBLAINS SUCCESSFULLY TREATED BY X-RAYS.

By A. J. CLEVELAND, M.D.,

Medical officer in charge of the Electrotherapeutic Department of the Norfolk and Norwich Hospital.

Case 1.—Patient, a rather delicate looking, but well-grown girl of 22, was sent to me in November, 1904. She had suffered from chilblains since the age of 2, and only got relief on the advent of summer. She had been treated by various remedies, without any benefit. The fingers of both hands were swollen and red, and the skin over them broken in many places, causing transverse cracks, which were naturally very painful. The nails were thickened, discoloured, and raised from their bed by yellow crusts. Hanging the hands down caused them to become "blue."

The feet were affected, but not so severely. There was a shallow ulcer on the left cheek, about the size of a shilling, and the left ala of the nose was slightly ulcerated. There was no scarring. While present all the winter the condition of the affected parts varied with the severity of the weather, and, as first mentioned, immediate relief was obtained when winter was over.

I tried her first with galvanism, applied by means of the hand bath, without any good result. Faradism, similarly administered, made her worse.

I then thought I would try X-ray exposures, giving them first to the left hand only. The improvement in this hand became so marked that I treated both hands alike, and the alteration in the appearance of her hands was very striking. By the beginning of February the hands were nearly quite well, with the exception of the nails, which remained discoloured and unsightly, and the girl said that she never remembered being so free from discomfort during any winter, although the weather was such as would ordinarily have caused her considerable suffering.

At the end of February I treated the face, and on March 24th my note says that the face and hands were practically well. During this present winter she suffered very little till the beginning of December, when there was some return of the condition, but to nothing like the extent usual at that time of the year. She had five exposures, which caused some reaction, but on that subsiding she continued very free from the complaint.

I think in this case the differential diagnosis between lupus erythematosus and chilblains has to be considered,

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and while admitting that the appearance of the face and nose was more suggestive of the former, the condition of the hands and feet, the influence of cold, and the history make me feel certain that the affection was really chilblains. As to the details of technique in this and the following case I can only say that I gave mild doses of the rays for 10 minutes three times a week, watching the effect carefully. My experience of the so-called accurate measurements of X-rays has, so far, been so discouraging as to make me rely entirely on the "rule of thumb."

Case 2.—A healthy young lady of 20 had suffered every winter, for the last six years, from chilblains on the feet. Previously she had lived in the South of England, and had not been troubled. Directly the weather is frosty or any snow falls, her feet swell, become red, and irritate greatly. She has to give up wearing boots, and walks in large shoes. There is no "breaking" of the skin, and the appearances are those usually seen in an ordinary case of chilblains.

Treatment commenced on January 2nd, 1906, and the result was most satisfactory. She had ten exposures to the front of her feet, followed by four or five to the heels, and she has had no more trouble, although the weather has been cold.

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FIVE CASES OF ATAXY TREATED BY FARADISM.

By A. J. CLEVELAND, M.D.,

Medical Officer in charge of the Electrotherapeutic Department, Norfolk and Norwich Hospital.

In four of the five cases the results were so satisfactory, and to me surprising, that I think they are of sufficient interest to merit publication.

The "cures" of locomotor ataxy are endless, but I do not claim to have done anything more in three of these cases than to have relieved a symptom of a disease which I believe to be incurable, however much it may vary in severity during its course.

Any theorising on the manner in which a Faradic current influences the complicated processes involved in the co-ordinating of muscular actions would be mere waste of time, so that I will simply give a few details of each case. I may say that four of these cases were seen by other physicians besides myself, and I am quite sure that there can be no doubt as to the correctness of the diagnosis in each case.

Case 1. Locomotor Ataxy.—Man, aged 38. Signs and symptoms of the disease well marked. Sent to me in June, 1905. Cannot write, and cannot walk without being guided. Treatment was first given through the hands, each being placed in a small separate bath, to which one pole of a Faradic coil was connected. The current was then passed for ten to fifteen minutes at a time, of a strength sufficient to be well felt by the patient.

The feet were later similarly treated. Three, and sometimes four, treatments were given each week. After four weeks' treatment he could write easily and walk without assistance. He continued attending with intervals of a fortnight's rest till November, since when I have not treated him, and during that time improved steadily.

Case 2. Locomotor Ataxy.—Female, aged 43. Evidences of disease wellmarked. Came to me in August, 1905. Chief trouble was in walking, which she could not do without a stick.

Treatment to the feet as in last case. Improvement rapid and maintained.

Case 3. Locomotor Ataxy.—Female, aged 46. Evidences of disease well marked. Chief symptoms: pain in back and down thighs and unsteadiness in walking, but she can walk

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without a stick. First seen in November, 1905. Treatment to feet as in case 1. Considerable improvement both as regards pain and walking, but the pain returns at times. She says she is much better in every way for the treatment.

Case 4. Traumatic Spastic Paraplegia with Ataxy.—Man, aged 33, was shot through the upper part of the spine during the South African War. This caused complete paralysis of all four limbs, from which he gradually recovered. He was sent to me in November, 1905. He was weak in all limbs, but could get about well and could do light work. Lower limbs showed increased reflexes and evidence of interference with the motor tracts. Lately he had developed extraordinary and violent ataxic movements of the legs after resting. Thus on starting to walk after sitting down his legs would be flung about in all directions, though after a few steps, or rather prancings, he would settle down and walk quite well until he rested for a minute or so, when the performance would be repeated. I am convinced of the complete genuineness of this symptom.

Treatment to the feet as in case 1. The improvement in the ataxy was very marked and has been maintained. He can now walk without any preliminary inco-ordinate movements.

Case 5. Locomotor Ataxy.—Female, aged 34. This was a very severe case. Patient was wasted and quite unable to stand alone. Evidences of the disease well marked. In her the same treatment produced no benefit.

I include this case as I think failures should always be recorded with successes, and also because these four cases of locomotor ataxy are the only ones I have treated by this method.

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ON THE USE OF IODOFORM SOLUTIONS IN X-RAY MEASUREMENT.

The liberation of iodine from its compounds by X-rays, and the production of colour changes thereby, was suggested by Freund some years ago as a possible method of measuring the amounts of X-ray radiation, by using iodoform dissolved in chloroform as the reagent.

Unfortunately the mixture is readily broken up by ordinary daylight, and indeed takes place spontaneously in the absence of light unless great care is taken to obtain the drugs in a state of purity, and Freund's proposal has therefore remained without practical application up to the present time. Bordier and Galimard have attacked the problem afresh, and in a communication made by them recently,* they define a new unit I. as the quantity of X-rays, which sets free one-tenth of a milligramme of iodine from a two per cent. solution of iodoform in chloroform, when the rays fall upon an area of one square centimetre, and when the thickness of the layer of liquid acted upon is 1 centimetre.

They have also determined the relationship between their unit I. and that of Holzknecht H. and give the following figures:

5 H. = 3·5 I.
7 H. = 5·5 I.
14 H. = 10·0 I.
22 H. = 15·5 I.

The first of these or 3·5 I. equals the dose producing tint B. of Sabouraud and Noiré. The determinations were made by comparing the colours assumed by the exposed solution with that of a series of tubes containing solutions of iodine in chloroform of known strengths, and by the device of examining them by yellow light the difficulties due to the presence of yellow undecomposed iodoform in the test solution were easily obviated. The authors have not yet submitted any practical form of apparatus for regular use, and the inconveniences of the action of ordinary daylight in producing the same decomposition as that caused by the rays is still an obstacle to the adoption of the method.

Arch. d'Elect. médicale, September 10th, 1906.

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THE ELECTRICAL RESISTANCE OF THE BLOOD AND URINE AS A TEST OF THE FUNCTIONAL EFFICIENCY OF THE KIDNEY.

By DAWSON F. D. TURNER, M.D.Edin., F.R.S.Edin.,

Lecturer on Biological Physics, Surgeon's Hall, Edinburgh.

In a communication made to the Royal Society of Edinburgh on December 21st, 1891, I gave an account of the experiments I had made to ascertain and compare the electrical resistances of various kinds of urine both in states of health and of disease. The fluids were held in a U-shaped electrolysis tube containing two disc-shaped platinum electrodes arranged so as just to rest upon the surfaces of the fluid, 21 cubic centimetres of which were used for each experiment. The measurements were made by Kohlrausch's method and at a temperature of 65° F.

As a result of the observations, which extended also to artificial urines, it was found that the specific resistance of a normal urine amounts to about 45 ohms and that the resistance is a measure of the salts, chlorides, phosphates, sulphates, etc., present in the urine; the greater the concentration the less the resistance and *vice versâ*. In disease the resistance was found to be increased chiefly in acute croupous pneumonia (due to the diminution in the chlorides), in diabetes mellitus, acute and chronic Bright's disease, and in pernicious anæmia. As it is believed that the glomeruli are mainly responsible for the presence of salts in the urine, a high electrical resistance, other things being equal, would indicate an impairment of the function of the glomeruli.

Within the last ten years I have made many attempts to measure the electrical resistance of the blood; various methods (dilution with distilled water, measurement of a column of blood in a capillary tube, etc.) have been employed and subsequently rejected. The principal difficulty depends upon the fact that only very small quantities of blood can generally be obtained at one time. The best results were obtained by placing 5 cubic millimetres of freshly drawn blood between two cup-shaped electrodes 3 millimetres in diameter, coated with spongy platinum and fixed at 0·75 millimetres apart. The length of the cylinder of blood between the electrodes is of less importance than its diameter because the cross-sectional area varies with the square of its diameter, and the resistance of a conductor varies directly as its length and inversely as its cross-sectional area. By employing electrodes of fixed diameter and at the same distance apart and the same quantity

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of blood for each observation, and by making the measurement at once before such changes as coagulation or evaporation could occur, fairly consistent results were obtained. The average specific resistance of normal blood measured in this way is 93·5 ohms, but it may fall to 85 or rise exceptionally to 130. The resistance depends again upon the salt concentration of the blood.

A striking change is to be observed in pernicious anæmia, the resistance in this disease being usually about one-half (50 ohms) that of normal blood. The deduction is that the blood in this disease contains an abnormal amount of salts due either to destructive metabolism or to renal inefficiency or to both. Light is thrown on this question by examining the resistance of the urine; this will be found to be abnormally high, hence we have the striking fact that while the urine contains too few salts the blood contains an abnormal amount. This, then, is a clear case of renal inefficiency. In view of this fact (impairment of the glomerular function of the kidney) the pathology and treatment of pernicious anæmia require reconsideration.

These results obtained some years ago, and the introduction of cryoscopy have led me to compare this method of determining the renal efficiency with that of cryoscopy and to originate a ratio which I will call "The Hæmo-renal Salt Index," viz.,

$$\frac{\text{The electrical resistance of the blood.}}{\text{The electrical resistance of the urine.}}$$

In health this would be equal to two or three whole numbers, *e.g.*,

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{93{\cdot}5}{45} = 2{\cdot}08.$$

If this number increases it indicates that the blood contains fewer salts and the urine more, and that the functional activity of the kidney is increasing; if, however, the hæmo-renal salt index diminishes it indicates that the functional activity of the kidney is diminishing. Thus in a bad case of pernicious anæmia the salt index is less than one, it is a fraction, but with an improvement of the patient it will at once increase and with his recovery it will return to normal. Here are some illustrations.

Case 1.—A. B.; healthy.

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{119}{38{\cdot}25} = 3{\cdot}1 = \text{hæmo-renal salt index.}$$

Case 2.—M.; advanced pernicious anæmia; patient under the care of Dr. G. A. Gibson; examined in July, 1906.

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$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{40{\cdot}8}{68} = 0{\cdot}6.$$

Case 3.—A. D.; pernicious anæmia with many relapses; a patient under the care of Dr. A. James; examined in February, 1902.

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{51}{115} = 0{\cdot}44 = \text{index}.$$

Case 4.—A. B.; secondary anæmia; patient under the care of Dr. Gibson; examined July, 1906.

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{85}{56{\cdot}1} = 1{\cdot}5 = \text{index}.$$

Case 5.—A. T.; chronic rheumatism; patient under the care of Dr. Gibson. Index 3·3.

Case 6.—W.; chronic interstitial Bright's disease; patient under the care of Dr. Gibson. Index 2·1.

Case 7.—H.; recovery from pernicious anæmia; red blood corpuscles, nearly 5,000,000; patient under the care of Dr. Gibson. Index 1·7.

This method is a more sensitive, a more rapid, and a more accurate one than cryoscopy, but it does not measure exactly the same thing. Cryoscopy measures the total molecular concentration, and is independent of the kind of molecule, provided they are not dissociated (salts, acids, and bases are exceptions). Electrical resistance depends only upon the salts, acids, and bases, and of these NaCl is by far the most important; it is practically unaffected by the presence of albumin, sugar, and other non-electrolytes.

Urea has a small effect only. The combination of cryoscopy with the determination of the hæmo-renal salt index would give us more precise information as to renal capacity than the use of either method alone; the one method should not be regarded as a substitute for the other but rather as complementary to it, but of the two the electrical method is so much more convenient and rapid that it is likely to come into extended use in the future.

I desire to thank Dr. James, Dr. Gibson, and Dr. Woodward for the help they have afforded me in the prosecution of this research.

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NOTES AND ABSTRACTS.

Röntgen Rays in Psoriasis and Eczema.—H. E. Schmidt* considers that in estimating the strength of the application required, individual attention is needed rather than a routine method, and in no case should full doses be given at first. For cases of psoriasis the rays should never cause erythema lest a fresh psoriasis eruption result, and for cases of eczema the erythema dose is usually superfluous. In cases of psoriasis the effect of an application of Röntgen rays declares itself after a few days, the formation of scales ceases, the infiltration diminishes, and finally disappears, so that at the end of about ten days the affected area should be completely recovered, except for the presence of pigmentation; the pigmentation is especially noticeable in brunettes; it dis appears in most cases in from eight to fourteen days. The strength of the application in most cases of psoriasis is not enough to have any effect on normal skin nor to cause a falling out of the hair; but it is better, by way of precaution, not to use the treatment for the head. A form of psoriasis, for which the method is not to be advised, is one in which there are many isolated areas scattered over the whole body. Röntgen ray treatment is especially indicated in (1) inveterate single plaques which have resisted all other methods of treatment; (2) psoriasis of the hands; (3) diffuse infiltration affecting large areas. The technique is simplest for the isolated plaques which can be treated as a whole, more difficult for surfaces in more than one plane, as, for instance, at the bend of the elbow, and most difficult for psoriasis of the hands and the diffuse infiltrations. Special care is needed in cases complicated by diabetes. This was exemplified in a case of psoriasis in a diabetic patient where plaques were present in different parts of the body; here, after quite weak applications, a somewhat severe erythema with peeling of the cuticle declared itself. The Röntgen ray treatment is only applicable for chronic forms of eczema, and is not suited to acute cases. The author has never found it do good for eczema of the lower limbs due to circulatory disturbances, and except in obstinate cases it is contraindicated for eczema of the scalp, because of the danger of causing a falling out of the hair. It is especially indicated in (1) anal and genital eczema with much irritation; (2) hyperkeratitic rhagadiform dry or moist eczema of the hands; (3) chronic lichen. The action upon the irritation is especially certain, but it does not show itself until after eight days, and the patient should be warned that the irritation may become temporarily more severe. Clear

* *Zeitschrift für Phys. und Diät. Therapie,* June, 1906.

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objective improvement usually becomes obvious after eight days. The result obtained appears to be most permanent in cases of eczema of the hands with marked hyperkeratosis. In other forms of eczema relapses are more frequent, but they usually yield readily to renewed treatment. The advantages claimed for the treatment as compared with other methods are that (1) the treatment is convenient for the patient; thus in eczema of the hands it makes the treatment by ointment superfluous, and the patient's occupation is uninterrupted; (2) recovery ensues in a shorter time; (3) the treatment is effective in old, obstinate cases which do not respond to other methods. The method has no drawbacks if it be carried out by some one who has the necessary experience. Of the author's eighty-three cases, forty-five recovered, fourteen were improved, and in only seven did little or no benefit ensue; seventeen left before the completion of the treatment; in twenty-two cases there was relapse.—*Brit. Med. Journal*, September 15th, 1906.

* * *

A New Interrupter for Alternating Circuits.—Messrs. Gaiffe, of Paris, have brought out a form of their "Autonome" jet break which permits of the satisfactory working of large coils from alternating circuits, and also serves as a rectifier for the charging of accumulators. The apparatus has the same general appearance as their jet break for direct current, and when connected up with the coil in the same manner it simply needs to be started by hand, and in about thirty seconds it attains synchronism with the periodicity of the supply current and then continues to run quite steadily and smoothly.

For use to charge accumulators it may be employed in conjunction with a step-down transformer, or with a resistance, but of these two methods the first is the most convenient and the most economical. This instrument will be of great advantage to X-ray workers in districts supplied by alternating current circuits, for it permits of easy and straightforward working, and is the best device hitherto made for this purpose. The appearance of the X-ray tube when excited from a coil worked in this way is said to be perfectly comparable with that of a tube worked from a direct current circuit.

The price is £7 without the mercury. A transformer equipped for charging at a range of pressure between 6 and 60 volts is also supplied at a price of £8 if required.

* * *

Pernicious Effects of Alternating Currents of High Voltage.—Under this title F. H. Millener, of Buffalo, N. Y., records three instances of ill-health, with dyspepsia and

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pallid complexion, observed in workmen employed in power-houses where high pressure alternating currents were generated. All three cases were employed to attend to transformers or worked in immediate proximity to these instruments which were operated at pressures about 20,000 volts. He states that he had observed twenty-one other similar cases. The symptoms were indigestion, constipation, mental depression or irritability, and pallor. A few days' holiday gave relief. He raises the question of the cause of the ill-health.—*American Medicine,* August, 1906.

* * *

The Toxic Action and Localisation of Radium Emanations.—M. Ch. Bouchard and M. V. Balthazard have extended a research, which was first conducted in collaboration with the late Professor Curie, on the toxic action on animals of the emanations from radium, and have determined to what extent the different tissues and organs are affected.* They have previously shown that radium emanations are toxic to mice and guinea-pigs when administered by the respiratory tract. By a modification of the method formerly employed they now demonstrate that the emanations are toxic to guinea-pigs when radio-active sulphate of barium is introduced into the peritoneum. Two grammes of the salt, having an activity of 5,000 and containing about 5 to 6 milligrammes of sulphate of radium, were inserted in a sac of collodion and introduced into the peritoneal cavity under aseptic conditions after laparotomy. Guinea-pigs treated in this manner succumbed on the tenth to the fifteenth day. It was found that the emanations are localised chiefly in the suprarenal capsules, 1 gramme of which contains as much of the emanations as 4·7 grammes of spleen, 11·4 grammes of lung, 15 grammes of skin, 60 grammes of liver, and 100 grammes of kidney.—*Lancet,* September 15th, 1906.

* Comptes Rendus, July 23rd, 1906, p. 198.

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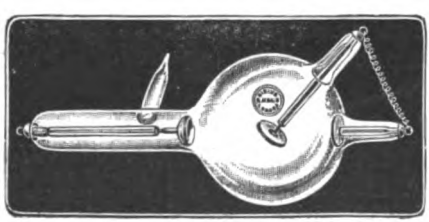

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MEDICAL

Electrology and Radiology.

No. 10. OCTOBER, 1906. Vol. VII.

ELECTRICAL TESTING AND THE LONGITUDINAL REACTION OF DOUMER.

In testing muscles suspected of showing a reaction of degeneration with the continuous current it will be found that a contraction is more easily elicited when the testing electrode is applied at the distal end of the muscle than when it is at the motor point. This effect was first noticed by Remak in 1876 in a case of wrist-drop due to lead, but it has only received attention in recent years, and has been described by Doumer as the "longitudinal reaction." It appears as though the motor point lost its importance, the longitudinal reaction being produced by direct stimulation of the muscular fibres, the reaction at the motor point by stimulation of the muscle through its nerves.

The longitudinal reaction is mentioned here to call attention to the fact that it is of the greatest utility in electrical testing, and an examination for it should never be omitted. It affords a means of eliciting a contraction in old standing or severe cases when the irritability of the muscle is so reduced that contractions are difficult to obtain with the electrode on the motor point. It also helps to confirm a diagnosis of reaction of degeneration when the test applied at the motor point leaves the operator doubtful as to whether it is "sluggish" or not. If in such a doubtful case the test with the electrode on the distal tendon gives a stronger and slower contraction than can be obtained at the motor point it is certain that degenerative changes exist in the muscle.

Again, it may happen that the contraction obtained with the electrode on the motor point is passably quick, while that obtained distally is decidedly slow. This probably signifies a degree of injury which is less severe than one giving a sluggish movement for both situations of the testing electrode, and it is a phenomenon which may often be observed if looked for.

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URINARY CALCULUS AND ITS DETECTION WITH THE X-RAYS.

By EDWARD W. H. SHENTON, M.R.C.S.Eng., L.R.C.P.Lond.,

Radiographer to Guy's, St. Peter's, and the Hampstead General Hospitals.

Reprinted, by permission, from the *Lancet* of September 15th, 1906.

I believe that there is a very general misconception with regard to the proper uses of the X-rays in the detection of urinary calculus. This opinion has been forced upon me by the reading of the little literature there is on this subject, and by conversation with practitioners who are interested in the results but are not conversant with the means by which diagnosis is attained in renal radiography. To put the matter briefly, it is not recognised that there are two ways in which the rays may be used, first, for screen examination and, second, for photographic effect, and beyond question the *former* is the one of service in diagnosing lithiasis. I make this statement after a full and deliberate consideration of the subject for upwards of nine years. It is worthy of note that, whenever or wherever a surgeon reports a case in which the X-rays have been used, he always says "the radiogram showed this or that" and never "the screen examination." It is not to be wondered, therefore, that one hears continually of the "deceptiveness of skiagrams" and "expert interpretations of radiograms," etc. For the last two years in my own practice I have used radiograms as the microscopist would use photography as a means of recording what has already been seen and as a reference when examining other cases.

There is little doubt that improvement in methods and apparatus is largely responsible for the better screening capabilities of the X-rays, but this does not tell the whole story. The active X-rays—by which I mean the X-rays as they illumine the screen—constitute a potent diagnostic instrument, and if we will concentrate our attention upon the shadows they throw of the living organs we can train ourselves to see much that will be of use to us as medical men. It has been truly said, "we see what we are taught to see," and the converse holds good in that if we are not shown a thing we do not see it, or at any rate are remarkably slow to appreciate its presence. It is only after watching a screen daily for many years that the X-ray operator has at last had forced upon his notice facts that are of inestimable value to him as a diagnostician. The same may doubtlessly be said of many other forms of diagnosis; it must have surely been a long

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time before the first users of auscultation found out how to sift and classify the sounds they heard and knew which were normal and which were not. With the screen examination of other regions of the body save those containing the urinary organs we are not concerned in this article, but these regions, the abdomen and pelvis, must be specially considered. There is, I regret to say, a general tendency to invent complicated apparatus for obtaining abdominal skiagrams—machines that cut the current off during a portion of a breath, apparatus that exerts pressure on or around a kidney to hold it still, etc., and no extra care is being bestowed upon the obviously efficient and invaluable screen. If anyone will take a little trouble and study the screening method I am about to describe I feel convinced he will be surprised, firstly, at how little he can see; secondly, at how much, and what assurance he will feel as to the presence of a stone when once he has seen it *in situ* upon the screen, and not as a mere smudgy mark upon a dismal-looking radiogram. I would not do away with radiography, for by its means much useful and confirmatory evidence in urinary cases is forthcoming, but it should be clearly understood that because an object is not visible in a photograph it is not necessarily absent in the subject photographed—the skiagram may be too bad; or—and this also is very likely—it may be too good. It should be generally understood that if a skiagram, particularly of the lumbar regions, possesses great pictorial beauty, a clear spine with a few well-defined and clear cut ribs, it is usually inadequate so far as diagnostic value is concerned. Pale stones, such as phosphatic calculi, and little stones will not appear, and to show these it is essential to get a dull grey image which, from a pictorial point of view, is unattractive. I am told by certain radiographers that surgeons will not receive these pictures but insist upon a bright cheerful skiagram which shows nothing useful, and to clinch the argument I have been shown splendid photographs taken by a local pharmaceutical chemist or instrument maker showing a black, well-defined calculus, and told that is how surgeons like their calculi shown. Now I venture to think that these radiographic experts are to blame for not properly enlightening the surgeon in this matter. It is not usual to blame the physician because a heart *bruit* is not as loud in one particular case as in another, and we do not usually suggest that if he cannot make this *bruit* louder we shall be forced to go elsewhere for our consultant. Is there, therefore, any more sense in blaming the radiographer because he only shows a faint shadow in a photograph when by its mere showing he can tell you three important facts —firstly, the presence of a stone; secondly, its quality; and thirdly, its anatomical position? Is it reasonable to hold up to him the record of a powerful X-ray obstructing oxalate

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stone which no amount of skill would prevent from throwing its shadow on a photographic plate and which therefore is an ideal subject for the lay X-rayist, and tell him that he must make all his uric acid stones appear the same? Then the surgeon will occasionally say: "I had a good X-ray photograph taken of the patient but it showed no stone." Just so; and if he had had a good screen examination followed by what he would call a poor photograph he would have had much useful and sensible information which would have served him better than his stone-obliterating but pictorially excellent radiogram.

Another difficulty the surgeon unintentionally puts in the radiographer's path is the following. He must have a skiagram of large dimensions and the larger the area the more accuracy he imagines he is getting. In this matter he is totally wrong, and if he would spare a little time and watch the effects of a contracting diaphragm on a given screen image he would quickly appreciate the fault. Increasing the size of a radiogram is like throwing extraneous light upo n a magic lantern picture, the excellence of the latter being in inverse proportion to the quantity of extraneous light thrown. Or, to use a photographic simile, the difference between an unstopped and stopped lens is the difference in effect between the large radiogram and the small. Now, if we have a large radiogram of the abdominal region, including both kidneys, ribs, and crest of ilia, we succeed in excluding all but the most opaque and obtrusive stones, and a little experimenting with a few small calculi laid upon a patient under X-ray examination will at once prove this fact. One striking case of this kind I might mention was when the open tube showed no calculus, a large diaphragm demonstrated a small elusive shadow in the left kidney region, and by contracting the diaphragm until it was only just larger than the little shadow a calculus was observed the outline of which was clean cut and clearly defined; the photograph which I took measures about 1½ inches square. "The smaller the diaphragm the better the skiagram," would be a true maxim if it were borne in mind that the actual image does not become smaller, and therefore the diaphragm must be sufficiently large to include the objects examined. We have no method of reducing the size of our image as in photography, for the X-rays cannot be refracted, reflected, or influenced in any such way. Now it would be very laborious and well-nigh impossible to take a quantity of little skiagrams about 1½ inches in diameter all over the urinary areas, and it is, therefore, to the screen that we must turn for assistance. In a screen examination it is possible to examine the patient in a series of small areas, and in this lies one of the superiorities of screening

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over photography. Moreover, the amount of movement constantly present in the abdomen, whatever precautions are taken, such as holding the breath, fixing the kidney with compressors, etc., makes photography in small areas often of little use, whereas the slight movement upon the screen is a positive help in the detection of a foreign body.

It may be of interest to the reader if I give a brief description of the routine examination of a patient suspected of urinary calculus, the principle being one I have employed with more or less success in the examination of over 1,600 cases. The source of light should be below and the screen above. This is effected by the patient lying on a table with a canvas top. He lies upon his face, for in this position the abdomen is reduced in antero-posterior measurement. The screen is placed upon his back. The tube from the first should be shaded by a diaphragm of some X-ray opaque material—metal or a special kind of indiarubber. The opening in this diaphragm should not be more than 4 inches if variable or 3 inches if fixed, and the tube is brought as close to the patient as is consistent with comfort. This will probably be 3 or 4 inches from the skin—if much nearer the high tension current is perceptible and causes more or less discomfort; it is not, however, painful or dangerous from this part of the tube. Now we come to an important consideration, and that is the difficulty of seeing an image upon the screen through this thick part of the body. It is essential that the operator shall have been at least fifteen minutes in the darkened room before he can fully appreciate the screen picture, and one has only to go into a dark room from bright daylight and wait to realise the enormous facility the eye has of adapting itself to varying degrees of illumination if given sufficient time, and how in a few minutes the apparently dark room becomes more and more a room of subdued light only. Coming from ordinary daylight to look at the screen in a quite dark room the operator's vision will slowly and steadily improve for quite fifteen minutes. There is no doubt, however, that confinement in a dark room is very tedious and unattractive to a busy man, and I have overcome this difficulty in the following manner. The screen image is, as most people are aware, yellow usually, but sometimes slightly greenish. I have therefore lighted the operating room with the complementary colour—in my own case a blue light, and this, though ample light for most purposes, leaves the retina immediately ready to receive the yellow screen light. I would particularly call attention to this matter as it has been a great comfort and for me an important feature in connection with screen examination.

What one observes first of all upon the screen is a dim circle of light, and this by suitable mechanism is adjusted in

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the middle line until the individual lumbar vertebræ are discernible. Then it is well to look for the transverse processes. If these are clearly seen the operator may feel assured that no calculus of reasonable size or of suitable chemical consistency will succeed in eluding detection. A diligent search is now commenced, by moving the tube over the renal areas, for any suspicious-looking body. It is curious how with practice a foreign object, such as a calculus, arrests the attention. Upon discerning the slightest suspicion of a foreign body the patient is told to take a deep breath. This is done for two reasons: first, a moving body is often easier to detect than one remaining stationary; and secondly, the relative movements of this object and surrounding organs bear an important relation to one another. For example, if, as is usually possible, one edge or part of the kidney is observable, note whether the movement of this and the foreign body are coincident. If they move as one the inference is in favour of the object being a stone in the kidney, and if the relative movements do not coincide it is extremely probable that the contrary is the case. Contract the diaphragm upon this suspicious object and try to make out its outline. Renal stones have often such characteristic shapes that this may be valuable evidence. Systematic search is made in this manner in renal, ureteric, and bladder regions, being careful to look up as high as the last two ribs, and while in this position make the patient breathe deeply, for I have several times in this manner driven a stone from its lurking place behind a rib. The kidney is a more movable organ than is usually described, and normally moves appreciably with respiration. When examining over the bladder region pressure on the screen should be made as this much improves the screen picture. In this region the sacrum must be remembered, but its extreme symmetry prevents it being mistaken for calculus material; also, in the event of finding calculus in this region remember the possibility of its being in the lower ends of the ureters. I have found calculi in both ureters at the same time, and from the comparison of their appearances have been able to give their composition; in one case this was oxalate of lime in the right and phosphatic material in the left. The photographic plate will be useful at this stage, for, having caught the calculus in as small a circle of light as is desirable for good definition, the plate in its light-tight envelope is placed over this spot between the patient and the screen—the rays being turned on and the lights in the room being out—a few seconds only are necessary by way of exposure with any good make of modern tube properly treated. There is no doubt that the diaphragm tends to increase the exposure, and this fact must be borne in mind.

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Practise in viewing the abdomen with a fairly large diaphragm—say 4 inches—will reveal many of the organs there contained. It is always desirable to have the intestines as empty of solids and as full of gas as possible. In this condition the whole length of the colon is clearly and brightly outlined, and as a contrast to the thick tissue of the kidney is most valuable, as it is usually easy to see the outer borders of these organs against the lighter colon. Scybala may lead to erroneous conclusions, and I must confess to twice being the cause of unnecessary operations by the deceptive appearance of the renal area. This is not likely to occur again, for there is a way in which it may be avoided, and that is by examining the patients on two occasions, when the intestinal matter will, at any rate, have altered its appearance even if it has not completely passed away by suitable treatment. It is distinctly advisable, though not always feasible, that every case of suspected calculus should be examined twice if an operation is to be based upon the results of the X-ray examination. Scybala more often lie to the outer side of the kidney and their presence then must make the operator suspicious of others possibly nearer the middle line. By observing relative movements, as the patient breathes deeply, mistakes may also be avoided.

I need not go further into the technique, the above description is a sufficient outline. In speaking of the screen in the diagnosis of urinary calculus I am not putting forward an untried theory, but one which a very large series of cases has proved to be sound and practical. It has reduced the inaccuracies of this branch of radiography to a minimum, and where failures do occur they are usually traceable to inability to carry out the method I have described completely. In the work I have done for St. Peter's Hospital, and which, owing to the kindness of Mr. S. Allen, I have been able to check as to accuracy, there has not been an X-ray report that has been proved incorrect since this system of strict screen examination was substituted for the former photographic method.

I would earnestly beg those who would avail themselves of the X-rays in cases of calculus to insist, even in acute cases, that the screen be used, and this can be done without much inconvenience to the patient—indeed, with infinitely less than that occasioned by the old unsatisfactory system of pushing a plate under him and placing the tube above. It is no exaggeration to say that this plan will fail in two-thirds of the cases examined.

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NOTES AND ABSTRACTS.

Frictional Electricity a Factor in Caisson Disease!—J. W. F. Macnaughton* holds that frictional electricity is an important factor in the production of the symptoms of caisson disease. His theory is that the caisson atmosphere is so charged with electricity that the electric potential in a moderately sized caisson may be compared in amount to that in a flash of lightning! The electricity is generated by the friction against the walls of the moist air which is pumped into the chamber. This electricity accumulates upon the body surface, and either by "directly permeating the tissues reaches the nerve centres, or by acting upon the peripheral nerve filaments or muscle end plates stimulates the centres. The nerve cells in consequence are thrown into a state of excessive activity, manifesting itself by discharges of a purposeless motor and sensory nature."

But surely a submerged caisson must be an exceptionally well earthed apparatus, and its walls must be at zero potential, as must also be its contents unless these be carefully insulated.

* * *

Röntgen Ray Treatment of Hypertrophy of the Prostate.—Carabelli and Luraschi† report two cases of enlarged prostate in men over sixty, which were much improved by X-ray treatment. The improvement was, moreover, maintained when the patients were seen a year later. The *modus operandi* was to place the patients in a suitable position, protecting the scrotum, penis, and thighs by means of a lead plate, and then to apply the rays to the perineum at 20 to 25 centimetres' distance for about ten minutes at a time for two or three times a week, then every fortnight. Under this treatment the urine cleared, the flow of urine was improved, and the frequency of micturition lessened. In one of the cases there was a quantity of residual urine, amounting to 200 grammes, before the treatment was commenced, and at the end of the course this had fallen to 10 grammes. The authors consider it unnecessary to pass the tube up the rectum, as the rays would act equally well when applied externally in the method used by them.

Moszkowitz also has used X-rays for enlarged prostate. Of three men who were treated, the first was sixty-six years old, and after three exposures, each lasting fifteen minutes, he was able to pass urine spontaneously. The second patient

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* *Lancet*, August 18th, 1906.

† *Bulletin Médical*, June 24th, 1905.

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was seventy-seven years old, and his prostate was enormously enlarged and very hard. The same treatment was adopted with the result that he could pass urine freely, though some of it was still retained. The third patient was completely cured. Two of them had severe hæmorrhage cystitis, and one had epididymitis after seventeen days. It was difficult to say whether these complications were the effects of the rays. As regards the technique, a rectal speculum was used, and the surrounding parts were covered by lead.

* * *

The Treatment of Leprosy with the X-Rays.—H. B. Wilkinson, M.D., Physician in charge, San Lazaro Hospital, Manila, reports thirteen cases of undoubted leprosy, seven of whom were greatly benefited, three were cured, and three were not improved by means of the ray.

The three cases not improved by the treatment were cases in which the lepra nodules or ulcerations were few, and scattered over the body in such a manner that only a few of them could be reached at a time in treatment.

The treatments were begun in 1904. Applications were made to the part of the body where the greatest amount of lesion could be covered by the exposure, which was usually given for about ten minutes with the anode at a distance of from 7 to 10 inches, the aim in treatment being to set up an effect as near to dermatitis as possible, without actually causing it.

In two cases dermatitis was actually produced, and these were the first to be reported cured. One was cured of his leprosy but died a year later of atrophy of liver with general anasarca, neither before death nor at the autopsy could any leprosy bacillus be found.

In another case of hypertrophic leprosy, of two years' duration, the X-ray was applied on January 9th, 10th, 11th, and 12th, 1905, to the right side of the face and ear at a distance of 10 inches, when a small blister was noted on the cheek near the centre of the exposure, which enlarged to the size of a thumbnail and scabbed over. X-ray treatment had been transferred to a large area on the back. Some portions of the part of face first treated showed some fading of colour and reduction of elevation, while one spot on the forehead, which had not been treated at all directly, had been reduced very perceptibly. By January 31st the patient had been treated seven times and showed marked reduction in the cutaneous manifestations of leprosy, not only at the points treated but also on parts of the body distant from the points of application.

At the end of June seventeen applications had been made, and there was a wonderful improvement in all of the leprous

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manifestations of this patient. All the elevated, dark-coloured spots on the face and body had disappeared and were replaced by slightly depressed, light-coloured scar tissue.

The deformity of the fingers had disappeared, except in the little fingers, where it was markedly decreased, while the defect in the muscles of the legs had entirely disappeared and he walked naturally. From July to the last of September, 1905, many microscopic examinations were made of scrapings from the old foci of disease for the lepra bacilli, all of which were negative, and the case is pronounced cured and is apparently well.

Another case was apparently well after fourteen treatments. The writer is inclined to believe that when a local lesion of leprosy is treated with the X-ray, the organisms there localised are killed and their bodies are absorbed into the system, thereby producing an immunity of the system against the living organism.

In support of this theory he cites the following facts:

The treatment of one spot upon a patient (leprous) produces improvement in spots at a distance from the one actually treated. The cure seems to progress in the distant spots, and to be just as complete as in those treated. The best results seem to have been obtained only when treatment is pushed to the point of killing the tissues, which would also probably be the point of killing the organisms. Cases in which there are massive localised leprous deposits are most rapidly improved, perhaps because in these cases there is an abundant culture on which to operate, and thereby immunity is produced more rapidly. In diffuse general involvement of slight degree or atrophic character, where there are only a few scattered organisms, less success has been secured. In two well advanced cases, in which the amount of new leprotic tissue was excessively great, the improvement was marked and rapid, but followed by loss of health and rapid physical decline. This may have been from overdosage, so to speak. —From the Journal of the American Medical Association, February 3rd, 1906. Abstract in *Journal of Advanced Therapeutics*, April, 1906.

* * *

Electric Lighting by Vacuum Tube. — Vague notes have reached this country from time to time of a new and successful mode of electric lighting by means of vacuum tubes now being introduced in America by Mr. Moore. In a recent number of the *Electrical Review of New York* there is a report on a test of one of these lamps, from which the following particulars are gleaned. The tube used was of glass, measuring 179 feet in length and $1\frac{3}{4}$ inches in diameter. It was excited by a pressure of 243 volts, and gave a light of an

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orange colour. It had been in use for 1,000 hours before the tests were applied, and it gave a light which was markedly superior to its rivals which were installed in the same gallery and consisted of (1) seven large compound Nernst lamps; and (2) eighty-eight incandescents of 8 c.-p. with twenty-five of 16 c.-p. Further details will doubtless be forthcoming later on.

* * *

Electricity in Constipation.—Lebon (*La Clin.*, June 1st, 1906) recommends galvanic currents of high intensity in the treatment of chronic constipation. One electrode is applied to the lumbar region and the other to the surface of the abdomen, or both are placed on the surface of the abdomen, one over each iliac fossa. If the first method be employed, neither reversals nor interruptions of the current are to be made; if the second, reversals of the current should be made from time to time, to avoid electrolytic action on the skin. In cases of chronic constipation spontaneous evacuation of the bowels may occur after the first application. More frequently six or seven are necessary before this effect is produced; and the longer the constipation has existed the more prolonged must the electrical treatment be before cure results. Simultaneously with this improvement in the expulsive power of the bowels, the motions become softer in consistency, and patients who have suffered from chronic constipation for a number of years may, when treated in this way, be enabled to have a motion regularly every day, if assisted by some gentle laxative. Failure occurs chiefly in patients who have become accustomed to strong purgatives, or large rectal enemata. In muco-membranous enterocolitis the results of electrical treatment are no less remarkable, and in these cases treatment should be continued until all mucus has disappeared from the stools. The author finds that the majority of cases require about two months' treatment, and that the cure which results is lasting; if recurrence of the trouble takes place a short repetition of the treatment is sufficent for a cure. During the course of electrical treatment, the author stops all drugs. The patients are instructed to solicit an action of the bowels every morning. If no action occurs he advises the use of a glycerine suppository, and that the patient after lying down for a short time should again attempt to empty his bowels. If this does not suffice the patient may have recourse to his usual purgative medicine, or may employ a small rectal oil injection for the next day. The electrical treatment is most effective when the patient is carefully dieted. In those patients in whom the intestinal trouble appears dependent upon dyspeptic disturbances a mixed diet has a good effect; not only does the intestinal

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trouble improve, but the fulness after food and the eructations lessen and the appetite improves. In some cases of enterocolitis in which diarrhœa alternates with constipation, the author finds that the electrical treatment soon causes the diarrhœa to cease; he also finds that the same treatment strengthens and renders firm the abdominal muscles in cases where these are found soft and lax. To improve the neurasthenic condition from which patients suffering from chronic constipation or enterocolitis are often affected, static baths are advised by the author. He concludes that in cases such as these, if no improvement occurs in two or three months with ordinary medical treatment, electrical treatment should be had recourse to.—*Brit. Med. Journal* (abstract).

* * *

Cataract as a Late Result of Severe Electric Shock.—In the *Ophthalmic Record* for January, 1906, Dr. Elleet, of Memphis, reports a case of cataract caused by a discharge of electricity as the late result of an injury from electric shock. In this case the patient recovered from the immediate injury caused by the shock, but in about three months the patient returned complaining that his vision had deteriorated. Examination showed a number of punctate spots in the lens under the anterior capsule. In six months the lens was completely opaque, and presented all the appearance of a mature cataract. The disease was confined to one eye alone.

* * *

Effects of X-rays upon Osteomalacia.—A. Ascarelli (*Gazzetta degli ospedali,* May 13th, 1906) has reported the successful treatment of a case of osteomalacia by the X-rays. He stated that he was led to try X-rays because of their well known action upon the genital glands, and the belief that ovariotomy may cure osteomalacia. The patient was unable to leave her bed when the treatment was commenced. After the expiration of two months there was observed a notable reduction of the menstrual flow, and three months later the woman was so greatly improved that she could be considered as cured. She was able to walk about, was free from pain, and had ceased to menstruate at all. This positive improvement or cure, and also the amenorrhœa, had continued for five months longer when the case was reported. In discussing this report, M. Arcangeli pointed out that osteomalacia occurs occasionally in women, who have attained the menopause. It would therefore appear that the explanation of the effect of the X-rays in this case was not to be found in the suppression of ovulation and menstruation, but rather in an abolition of the internal secretion of the ovary, the

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X-rays acting in a similar manner to ovariotomy by causing a veritable atrophy of the ovaries.

* * *

The Position of the Lesion causing Facial Paralysis.—Dr. F. B. Bishop, in a paper on "Facial Paralysis,"* gives the following indicating characters for locating the site of the neuritis producing the paralysis: "If the facial nerve is attacked at the base of the skull we would expect paralysis of the auditory and other cranial nerves, together with general cerebral symptoms (headache, vertigo, vomiting, etc.). If the lesion involve the nerve between the pes anserinus and that point where the chorda tympani is given off the facial muscles alone are paralysed, if between the latter point and the stapedius nerve, the taste will be lost on the anterior two-thirds of the tongue in consequence of the involvement of the gustatory fibres of the chorda-tympani nerve. If the lesion is between the stapedius and geniculate ganglion, the stapedius will be involved, producing hyperacuity of hearing. If the geniculate ganglion or the nerve above is involved the velum on same side is paralysed."

* * *

A New Dosimetric Method for X-rays.—At the third International Congress of Medical Electrology and Radiology, held in Milan in September of this year, G. Schwarz (Vienna) demonstrated a new mode of measurement for use in X-ray work. His apparatus is based upon the power of X-rays to decompose mercuric chloride with the formation of mercurous chloride (calomel). As calomel is insoluble a visible precipitate is formed, its bulk indicating the extent of the reaction. Schwarz uses a solution of oxalate of ammonia, to which mercuric chloride has been added. Full details of the practical working of the method have not yet come to hand, but one can readily understand that by the use of a graduated vessel a qualitative notion of the amount of reaction might be arrived at. It is stated that a visible precipitate is produced even by small quantities of X-rays.

* * *

Treatment of Adherent Pleura by Ionic Medication.—Leduc, in a recent number of *Archives d'Electricité Médicale,*† discusses the causes of lateral curvature in young adults, and expresses the opinion that some of them may be due to the influence of pleural adhesions. He says the theories which have been brought forward to

* *Journal of Advanced Therapeutics,* June, 1906.

† October 10th, 1906.

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explain the causation of lateral curvature of the spine are not completely satisfactory. The theory that they are due to weakness of the muscles affecting one side of the spine is difficult to prove, and these muscles when tested electrically respond in a normal manner. On the other hand an examination of the chest by means of X-rays may reveal a decrease of transparency on the concave side and a reduction of the movement of the ribs and diaphragm on the same side. He believes that the interference with respiration, which is caused by pleural adhesions, may be the cause of the curvature in many cases. Inquiry should be made into the past history to discover whether the patient has suffered from pleurisy in childhood. Upon these grounds he considers that the most rational mode of treatment for lateral curvature is to endeavour to set free the pleural adhesions by any means which may be available, and he refers to his previous observations on the subject of the softening of old cicatricial tissue by means of the electrolytic introduction of ions of chlorine. In order to apply this method to the chest he makes use of a large pad of absorbent cotton or lint in several layers, moistened with a warm one per cent. solution of chloride of sodium, this applied so as to cover the entire affected side of the chest, and a large sheet of tinfoil placed upon it is connected with the negative pole of the battery, the circuit being completed through the medium of a foot bath of warm salt water containing the anode. The current is gradually raised until it reaches 100 milliampères and should be allowed to flow for an hour, the treatment being applied twice a week for the first fortnight and for once a week afterwards. Under the influence of this treatment he states that the range of movement of the affected side of the chest becomes wider and that the transradiancy of the chest to the X-rays becomes better. The difference in size of the two halves of the thorax becomes less, and he considers that if the existence of extensive pleural adhesions be recognised sufficiently early the treatment of the condition by the ionic method will do much to reduce deformity even in severe cases.

* * *

An Electrical Fly Trap.—A very ingenious apparatus has been invented by M. Chaulin, for the destruction of flies and mosquitos. It is a metallic cage formed of fine chains almost touching, and held rigid by two metallic rings above and below. The chains are alternately connected, through a resistance, with the positive and negative electric light mains, and the cage is suspended from the ceiling. The insects are attracted by an electric light burning within, and in passing between the chains, make contact with them and are effectually electrocuted.

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REVIEWS.

MEDICAL ELECTRICITY. By H. Lewis Jones, M.D., Medical Officer in charge of the Electrical Department, St. Bartholomew's Hospital. 5th edition, with 12 plates and 185 illustrations. 519 pages. London: H. K. Lewis. Price 12*s.* 6*d.* net.

Dr. Lewis Jones has just brought out a new edition of his well-known handbook, and has taken the opportunity of rearranging the matter in a way which, we believe, will be appreciated.

Thus the first chapter dealing with the history of the subject has been omitted, and in the present edition chapter I gives a useful *résumé* of the elementary physics of electricity in a brief and concise manner, which is calculated to serve well for purposes of reference to those who wish to refresh their memory on such matters as Ohm's law, induction and self-induction, transformers, the Wheatstone's bridge, ionic conduction, electrons, and so forth, without the need for resorting to other works on electricity, although many valuable references to such works are given when they seem to be necessary for a fuller elucidation of any difficult point.

The second chapter is on medical batteries, and the accessory apparatus used in connection with them, and contains an illustrated account of the discharge curve of induction coils and of the mechanical interrupters which have been brought into use for providing measurable interrupted currents, as advocated in the writings of Leduc.

In chapter III the apparatus used for cautery work and for exploring lamps is considered, with a few paragraphs on electro-magnets for ophthalmic use and on ozone.

Then follow chapters on the utilisation of the mains, direct and alternating, for medical purposes, with illustrated descriptions of all the best forms of apparatus, on Ruhmkorff coils, on static and high frequency apparatus, and on X-rays. The last of these subjects is handled in a thorough manner, nearly 60 pages being allotted to it.

In the second part of the volume there are separate chapters: (1) on the general effects of electrical currents, including electrolysis and Ionic medication, the effects of static and high frequency currents, of X-rays, of radium, and of phototherapeutic applications; (2) on the use of electricity in general morbid conditions, as, for instance, in gout and rheumatism, leukæmia, tuberculous affections, and rodent ulcer and malignant growths; (3) on diseases of the nervous system; (4) on diseases of the circulatory, digestive, respiratory, and urinary organs; and finally (5) on diseases of the skin.

The separate chapters on the electric bath, and on electrolysis in surgery have disappeared, the matter formerly

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found under those headings being now arranged in its proper place in the chapters on apparatus, or under the headings of the diseases for which such methods are employed.

The chapter on diagnosis is also removed, and the matter formerly contained in it is relegated to its proper place in the first of the chapters on the diseases of the nervous system.

We consider the rearrangement to be a decided gain for the general examination of the subject of medical electricity, and we also observe, as a significant sign of the times, that the use of electricity in affections of the nervous system no longer overshadows its other applications in medical work; on the contrary, indeed, it is in these other sections that most of the modern advances are being made.

We heartily commend this book to all students of the subject, and we think that this new edition represents a great advance upon the preceding one, in spite of the short time which has elapsed since the appearance of the fourth edition.

TRAITEMENT DE LA TUBERCULOSE PAR LES COURANTS DE HAUTE FREQUENCE ET DE HAUTE TENSION, BASÉ SUR L'ÉTUDE DU CHIMISME RESPIRATOIRE, par H. Thiellé, Rouen. 1905. Crown 4to. 140 pages.

This volume is an account, arranged largely in tabular form, of a number of cases of pulmonary tuberculosis treated by high frequency currents, and it bears the stamp of genuine and laborious work. The author, after briefly touching on the work done by others in the same field, states that in the years 1900 and 1901 he began with an attempt to treat three cases of pulmonary tubercle, of different degrees of severity, and that though all these cases had died there were not wanting signs of amelioration both in their local and general conditions while they were under treatment. In spite of the discouragements due to the first failures he resumed the treatment of tuberculosis by high frequency currents in 1902, and endeavoured to strengthen his position by minute chemical investigations of the changes produced in his patients by their disease and by the influence of the treatment.

Starting with the observed facts that the metabolic changes are exaggerated in the tuberculous patient either as a constitutional defect or as a defensive reaction, or perhaps as a consequence of the presence of the bacillus, while the gouty individual belongs to an opposite type and tends to resist the tuberculous invasion strongly, Thiellé proceeds to lay down the axiom that in order to treat a tuberculous individual one must endeavour to modify his metabolic exchanges to bring them up to the normal standard, if possible. He believes that this result can be more or less accomplished by the employment of high frequency currents, and his tables

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show that this is the case and that the tendencies towards recovery go hand in hand with the acquisition of a normal character by the respiratory chemical processes. Thiellé's work, demanding as it does much patient study, is not easy to review within the limits of a brief notice. It will be sufficient to mention that for each case figures will be found in sixteen or eighteen columns relating to the chemistry of respiration, with ten more columns relating to the microscopic examination of the blood. These figures are given for many dates during the course of the treatment of each case, so that the work represents an enormous amount of patient investigation and one which deserves to bear good fruit. Accounts are given of his researches upon twenty-six patients, and he states that of this number thirteen were cured, nine being individuals engaged in laborious occupations, four were still under treatment, and seven were too far advanced to offer any hope of success, but were given the treatment as means of studying the influence of high frequency currents. He also states that no drugs were used by any of the patients while under his care.

THE RÖNTGEN RAYS IN THE DIAGNOSIS OF DISEASES OF THE CHEST. By Hugh Walsham, M.A., M.D., etc., and G. Harrison Orton, M.D. 8vo. 80 pages. With 18 plates and 22 illustrations in the text. London: H. K. Lewis. Price 6*s*. net.

This little volume is the outcome of a large amount of practical work upon the exploration of the chest by X-ray methods. It forms an admirable monograph of the subject and should be in the hands of all X-ray workers. The offices held by Dr. Hugh Walsham of Senior Assistant Physician to the City of London Hospital for Diseases of the Chest and of Chief Assistant in the Electrical Department of St. Bartholomew's Hospital render him doubly qualified for the production of such a book, in which he has been most ably assisted by Dr. Orton. The volume contains seven short chapters, in which will be found all the points of importance in connection with the practical exploration of the thoracic organs by X-rays. The normal chest, pulmonary tuberculosis, pleural effusion, and other morbid pulmonary conditions are considered in the first five chapters. The sixth deals with the heart and the seventh with aneurysm. Most of the plates are reproductions of actual radiographs, without re-touching, and the evidence brought forward by the authors in support of the different propositions advanced is sound and well stated. The book closes with a full bibliography and an excellent index. The volume is valuable, not only for its matter but also for the admirable manner in which the authors have presented their subject.

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MODERN PHYSIO-THERAPY. A System of Drugless Therapeutic Methods, Including a Chapter on X-ray Diagnosis. By Otto Juettner, A.M., Sc.M., M.D., M.E., Ph.D., Professor of Practice at the Cincinnati Post-Graduate School of Physiological Therapeutics, Associate Editor *Journal of Physical Therapy* and *International Journal of Therapy*, Fellow American Electrotherapeutic Association, Member Röntgen Society, London, Eng., etc., etc. Harvey Publishing Co., Cincinnati, O. 513 pages. Price, cloth, $6.00 net.

This volume provides an interesting account of the various methods of physical therapeutics. The great expansion which this branch of treatment has experienced in recent years renders it difficult to do full justice to the whole subject in a single volume, while perhaps those who are experts in this or that branch of physical treatment may wish that the author had been able to give fuller details of their particular subject. The general medical reader will find the book useful as providing a fair general statement of the present position of work in hygiene, diatetics, photo-therapy, hydrotherapy, mechanotherapy, thermotherapy, and in electrotherapeutics. The book has eleven chapters which take up the first 300 pages, and the remainder is devoted to a "therapeutic index" arranged alphabetically.

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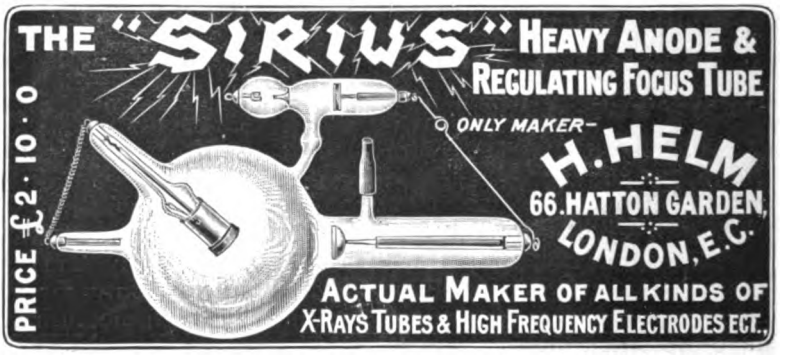
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MEDICAL

Electrology and Radiology.

No. 11. NOVEMBER, 1906. Vol. VII.

THE PATHOLOGY OF SCIATICA.

Inasmuch as sciatica is a condition for which electrical treatment is often invoked, anything which helps to throw light upon its nature is of considerable interest to our readers. Dr. William Bruce* has recently drawn attention to the frequency with which changes in the hip-joint may be found, if looked for, in patients supposed to be suffering from sciatica, and insists upon the importance of a careful examination of the joint in every case. His letter serves the useful purpose of recalling to mind a lecture on Sciatica delivered by him in 1903,† which does not appear to have received as much attention as it deserves, and we therefore take this opportunity of referring to it.

Bruce's contention that a very large proportion of cases of sciatica is due to changes in the hip-joint is based upon sound evidence. Not only does he find from an analysis of over 400 cases that sciatica is commonest between the ages of 50 and 70, *i.e.*, at the time of life when the so-called senile arthritis is most usual, but in more than half his cases he has noted the occurrence of the following symptoms of joint trouble, viz., tenderness of the capsule, inequality of the gluteal folds, wasting of the glutei, and pain on flexion or rotation of the joint.

While we entirely agree with Dr. Bruce in his arguments for the careful examination of the hip-joint in all cases of supposed sciatica, we are unable to go as far as he seems willing to go and to doubt the existence of a genuine peri-

* *Lancet*, November 3rd, 1906.

† *Lancet*, August 22nd, 1903.

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neuritis of the sciatic nerve. On the contrary, we consider that satisfactory evidence exists of the occurrence of painful sciatic perineuritis, and of the occurrence of sciatic pain due to adhesions around the trunk of the sciatic nerve and relieved by a surgical operation for the breaking down of such adhesions. The practical difficulty lies rather in the diagnosis of any given case, and for this the instructions as to the examination of the patient, as given by Bruce, are most valuable. So, too, for the questions of prognosis and of treatment. All those who have had sufficient experience of the treatment of cases of "sciatica" by electrical methods will probably be willing to admit that the results are too commonly disappointing, and that although isolated cases of the complaint are occasionally met with in which striking success has followed a few electrical applications, yet the usual results are more often indifferently good when they are not complete failures. The reason for this will be readily seen when we realise that the cases called sciatica, but due to chronic arthritis, form so large a proportion of the whole mass of sciaticas referred for electrical treatment. The importance of an X-ray examination of the hip-joint in all cases of presumed sciatica is sufficiently obvious.

NOTICES.

The Annual Exhibition of Electrical Apparatus held under the auspices of the British Electrotherapeutic Society has always been an interesting event, and the meeting devoted to the Exhibition is usually one of the best attended gatherings of the year. The need for more space in which to display the apparatus has decided the Council to hold the Exhibition this year at the Queen's Hall, Langham Place, W., instead of in the Medical Society's rooms. We wish to remind our readers that all qualified medical practitioners are cordially welcomed, and we hope that there may be a large attendance, as the show of apparatus promises to be a very good one. The date is fixed for December 14th, and the Exhibition will be open all the afternoon and evening.

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THE EXTENDED USES OF THE RÖNTGEN RAY IN THE DIAGNOSIS OF DISEASE.

By W. IRONSIDE BRUCE, M.D.

Physician to the X-Ray Department Charing Cross Hospital; Radiographer Great Ormond Street Sick Children's Hospital.

We are all more or less interested in extending the field of usefulness of the X-ray as a means of diagnosis in disease, and I approach this subject with considerable trepidation, for I have to attempt to interest you in a subject concerning which most of you, no doubt, know more than I do myself.

In the few points which I should like to bring to your notice I do not wish to claim anything as new; but this paper will serve its purpose if it only has the effect of reminding you of them and calling attention to the advances that are being made.

It fills one with joy to demonstrate for the first time a stone in the kidney or ureter. It is plain, however, that to be content with the mere demonstration of a stone in the kidney is not to be thought of. Improvements in the method of carrying out the examination leads to more valuable results. Lately an article appeared in one of the medical journals, in which the statement was made that renal calculi were associated in the author's mind with "mere smudgy marks upon a dismal-looking radiogram." I think, if I may say so, that this statement is much to be regretted. Of course, it is easily understood that without employing the methods now commonly adopted for the improvement of the definition of radiograms of the renal region such a statement would be correct. One has only to look at Mr. Reid's splendid work in this branch of radiographic diagnosis in the special number of the *Practitioner* to see at once that it *is* possible to improve on the "mere smudgy marks upon a dismal-looking radiogram." Mr. Reid quite properly points out the great advantages to be derived by improving the definition of the radiogram of this region. The size, number, and probable position of the stone or stones in the kidney can be reported for the information and guidance of the operator. Here I should like to point out the possibility of supplying further information. Mr. Reid says that in a good radiogram one can see the outline of the kidney itself; this fact is of the greatest use in cases where one gives a negative diagnosis. In such cases considerable knowledge of the condition of the kidneys may be gained by observing the size of the shadows cast by them. I have made a practice of noting this in my reports for some time past. In a case of renal calculus the size of the unaffected

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kidney is of importance. The presence of a hydronephrosis suggested by an increase in size of the outline of the kidney in a case in which it is suspected that a stone is impacted lower down in the ureter is strong evidence in favour of that condition. Where there has been renal colic due to tubercular *débris* or hæmorrhage, and where the presence of a stone has been excluded by the radiogram, should the outline of a kidney be increased in size, this observation greatly strengthens the hand of the radiographer. To illustrate the value of such an observation I wish to tell you of a case in point. A patient was sent to the X-ray department at Charing Cross Hospital on three separate occasions for the diagnosis of renal calculus. The symptoms were those typical of this disease. Seemingly a healthy man with severe hæmorrhage from the ureter, recurrent attacks of pain in the back and groin, accompanied by sickness and vomiting. The radiogram showed no stone, but on each occasion a note was made on the report that the outline of the left kidney was enlarged. The surgeon, however, was convinced that there was a large stone in the kidney and decided to operate. At the operation there was found a large tubercular kidney. In this case the clinical symptoms were, I think, all in favour of stone, and yet by observing the size of the shadow of the kidney one was prepared to support one's diagnosis, and I may say I did so on this occasion as forcibly as possible.

Not long ago an eminent nasal surgeon told me that it is not impossible that the frontal sinus may be opened up for the treatment of a suspected empyema and yet no pus be discovered. You are all probably aware of the possibility of recognising the presence of pus in the frontal sinus by the means of the X-ray; but being struck by the statement made by a man whose knowledge of this branch of surgery commands respect, it has occurred to me that perhaps radiograms taken after the manner suggested by Professor Goldman might be of interest to you. I have here a radiogram of a normal frontal sinus side by side with one showing empyema of the right sinus. The obliteration of the outline of the right sinus is fairly well shown, and you will notice evidence of the pus having extended upwards and to the left in the diploe.

Professor Goldman is also responsible for another suggestion. The dark shadow cast by the trachea in radiograms of the thorax is familiar to us all, the outline of the trachea is easily and well seen. He suggests the use of this in recognising the position of stricture of the trachea in tumours about the root of the neck. I have had the good fortune to secure a radiogram of a case of a sarcoma of the root of the neck. It bulged on both sides of the trachea and

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gave rise to acute symptoms in the way of shortness of breath and cyanosis, so much so as to call for relief by tracheotomy. To decide the position in which tracheotomy was to be done this radiogram was taken. It shows that there is little or no constriction of the trachea in its upper part.

Tracheotomy in the usual position in the neck would have done nothing to relieve the symptoms, for the difficulty in breathing must have arisen from constriction lower down. In this case the operation was postponed and subsequent post-mortem proved the value of the observation.

In this connection the familiar translucent areas which are to be seen in radiograms of the abdomen, which are due to accumulations of gas in the intestines, are observable on the plate for the same reason as the trachea is. It has occurred to me that this appearance might be turned to some use, or if the rectum and large intestine be inflated with air they will stand out clearly as such, in radiograms of the abdomen and pelvis. If this assertion proves correct it would be possible by this means to observe the seat and extent of any stricture of this part of the alimentary tract.

I should now like to say a few words concerning the value of X-ray examination in chronic arthritis. This is a subject in which I am greatly interested. I have the honour to be placed in charge of the electrical department at Charing Cross; and we find patients, suffering from diseases for which there is no well-known remedy, have a way of arriving at our department for treatment. Consequently the accumulation of poor sufferers from chronic arthritis daily increases. This fact led me to take a special interest in this group of diseases. Such cases frequently are sent for treatment to the electro-therapeutist and their recognition is of value to you.

Joint diseases of a chronic nature present great difficulties of diagnosis. Signs and symptoms characteristic of one disease are also found, with perhaps slight modification in another, the pathology of which is quite different. The pathology of the whole group of chronic arthritis is obscure and the ætiology is doubtful, and in the case of the deep-seated joints, such as the hip and shoulder, it is exceedingly difficult by ordinary methods of examination to discover the actual condition of the parts affected. Such titles as osteo-arthritis or rheumatic gout have been invented to disguise the confusion of ideas that exists, and no two text-books will be found in which exactly the same classification is adopted. All the difficulties are not removed by radiographic examination, but if a good radiograph of the joint or part affected is obtained the eye may be brought to aid the other senses in the effort to understand the nature of the changes that have taken place.

The whole question of treatment rests upon success in diagnosis. If rheumatoid arthritis is mistaken for gout the

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result of treatment must be bad, or if gout is mistaken for rheumatoid arthritis and the diet arranged accordingly the patient's sufferings will probably be increased.

Gout, as is well known, is characterised by the deposit of the salts of uric acid in the tissues of the joint. This deposit takes place primarily in the ligaments, but later the articular cartilages are also affected. In marked cases considerable accumulation of the combined urates of sodium, potassium, magnesium, and calcium take place in the neighbourhood of the joints. The first three salts are only slightly opaque to the rays; but those of calcium and magnesium are more dense. As the urates do not exist in a pure form in the tissues, but in combination, it is found practically that in a radiogram of a case of gout the accumulation of urates throws a shadow of considerable density on the plate.

You will see in radiogram No. I*a* the outline of the bones of a patient, who was undoubtedly suffering from gout. There is to be seen distinct additions to the outline of the phalanges in the positions marked with an arrow. I*b* is a normal finger for comparison with the abnormal. Fortunately an opportunity of confirming the diagnosis of gout occurred in this case. One finger, on account of septic infection and suppuration of a joint, required amputation. This afforded the opportunity of examining the remaining joint of the finger. Deposits of chalky material were found in and around the joint, and a portion of the deposit gave the murexid test. Another portion of the deposit was separately radiographed and the resultant shadow is seen in radiogram I*c*. No doubt therefore can exist that gouty deposits can be seen in radiograms. The finger joints are, *par excellence,* the place to make out even the slightest deposit. They may be seen, however, in other joints. They appear as additions to the outline of the bone and are often not larger than a pin's head. Radiogram No. II shows typical gouty deposits in the positions relative to the phalanges which they usually assume.

Rheumatoid Arthritis is characterised, as is gout, by swelling of the joints of the hands and feet; later all the joints of the body may be attacked. Well advanced cases do not present much difficulty in diagnosis; but early cases in which the trouble is just commencing there is often considerable difficulty in differentiating this disease from gout. The bones of hand in radiogram No. III, an advanced case of rheumatoid arthritis, show sulnar deflection of the bones of the fingers and subluxation of the joints. The bones of the carpus and metacarpus are also considerably altered. The heads of the phalangel and metacarpal bones have been destroyed and eroded to an extraordinary extent. At one point, at least, there is a sharply defined, punched-out looking cavity which

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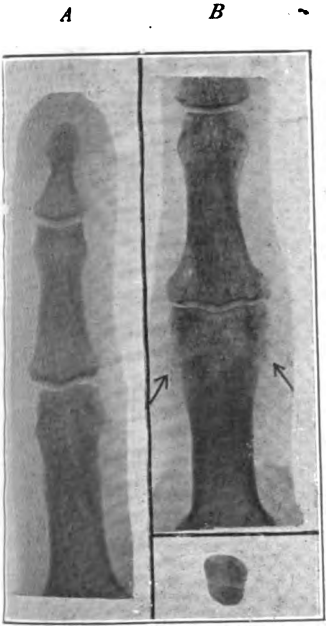
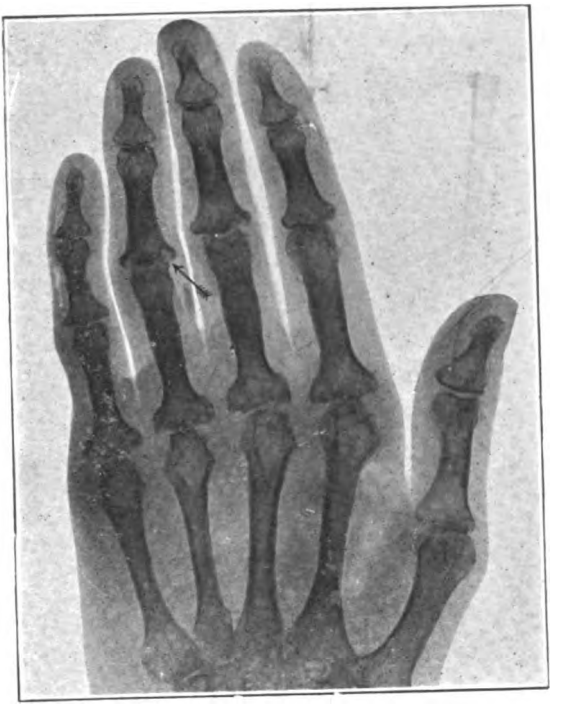


I.



III.

II.

IV.

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I have marked with an arrow. The latter peculiarity is better seen in radiogram No. IV. The bones of the carpus are indistinct in outline and present what is best described as a mushed-up appearance. Their outline is lost and they all appear to have more or less blended together. The lower end of the radius and ulnar are often curiously affected. For about half an inch from the joint the bone is peculiarly transparent, this appearance ending abruptly in a sharp line, where the bone resumes its normal appearance.

In early cases of this disease the bones are normal in appearance; there may be a suggestion of translucency with a loss of definition in the bones of the carpus, but there is never any deposit about the phalanges as seen in gout. The appearance of any necrotic areas as described above, with the absence of additions to the outlines of the bones, at once suggests rheumatoid arthritis.

In cases then of chronic arthritis it is of advantage to get a radiogram not only of the affected joint but of the bones of the hands, for often in them one finds an indication of the cause of inflammation in a remote joint. To make the point clearer may I give you the history of two cases. One, a patient, aged 45, for some months suffering from severe pains in the shoulder joint accompanied by what from his description seemed to be night startings presenting on physical examination the features of tubercular disease of the joint, was sent from the surgical out-patients to the X-ray department for X-ray examination. The radiogram of the shoulder joint showed no changes suggesting such a condition. On taking a view of the bones of his fingers distinct urate deposits were observed about the phalanges. This observation was reported and on appropriate treatment the symptoms disappeared.

The second case is one of a patient in exceedingly good circumstances (a fact which is not uncommonly taken to indicate with certainty the existence of gout). She had suffered from rheumatic pains for some years and had visited a large number of the Continental and other spas with the view that the origin of her troubles was gout. Deriving no benefit from such treatment, but on the contrary, getting steadily worse, she was sent for the purpose of investigating the cause of her pains, and on examining the bones of the fingers in a radiogram the changes characteristic of rheumatoid arthritis were only too evident. I have since heard that treatment suitable to this disease has given eminently satisfactory results.

In conclusion I hope that what I have said has been of interest to you and not in any way detrimental to the advancement of the X-ray as a means of diagnosis in disease.

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X-RAY WORK IN AMERICA.

By REGINALD MORTON, M.D.

I believe myself to be the only member of this Society who responded to the invitation of the American Röntgen Ray Society to be present at their annual meeting. I was most politely received and hospitably treated in every possible way. I was, indeed, accorded practically a public reception, being introduced to the whole Society in session. In acknowledging their kindness I conveyed to them a message from the British Society, telling the members of the American Society that you sent your greetings, were anxious to co-operate with them in general work, and hoped that some arrangements might be made by which the transactions could be exchanged. The idea seemed to take hold of the meeting in a way that pleased everybody. The American Society is ready to send over a matter of a couple of hundred of their transactions if we will do the same by them. That is a bargain of which we should certainly get the better, for their volume is full of good material, and is certainly bulkier than ours would be if it were bound up in the same way. I hope that our Society may be able to meet them in that respect. In coming away they gave me a letter, signed by direction of the President and Executive Committee, extending their hearty greetings to our members.

The American Röntgen Ray Society holds one meeting in the year. This as a rule extends over three days, and is so arranged that it can extend to four if necessary. They go to work in a truly businesslike way, beginning at 9.30 in the morning and, with an hour's interval, going on until five or six at night. The evening is given up to various functions, and the President's address is delivered on the evening of the first or second day.

They had an exhibition of radiographs, and I do not think I have ever seen such an amount of first-class work. The transparencies, negatives, positives, and finished prints of all kinds were of the highest quality and clearness. This naturally aroused my interest. A radiograph of the pelvis of a stout person, for instance, was so excellently done that it was easy to see the texture of the bones.

I found out some points as to their methods. With regard to the apparatus, the first thing to be noted is that the Wehnelt break is practically universal, being used at least in nine cases out of ten. The voltage pressure is, in general, about 220. The coils are wound and constructed in a way such as I have not seen in this country. They found that they wanted greater power, and accordingly they began to

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use larger currents, not only in their coils but also in their tubes. They begin by putting in an enormous primary. In this country the primary and core of a 12-inch coil will weigh from 20 to 30 lbs. Over there the best cores are made from flat strips of transformer steel, made first up to a square, and afterwards by means of narrower pieces at the sides are made approximately round. The core for a 15-inch coil weighs over 100 lbs. This is wound with a heavy primary wire. We in this country use No. 12 or No. 14 standard wire gauge; over there they put in No. 10. After about every dozen turns they bring out a tapping, and in this way with one heavy wire they can vary the self-induction of the coil in any manner they please.

As to the current, they use never less than 10 ampères, and when they are trying to get through the abdomen and pelvis they will run up to 40, 50, or 60 ampères at the pressure of 220 volts. The wire on the secondary coil is a good deal heavier than is customary here. In building a 15-inch coil the maker puts on enough wire to give a 30-inch spark. But he insulates it for only 15 inches and in that way keeps the secondary windings closer to the primary. In the insulation of the primary the use of solid ebonite tubes has been given up. The primary tubes are made by rolling up a sheet of ordinary thin ebonite. The sheets have a higher dielectric strength than the ordinary solid tube. The current in the X-ray tube is sometimes carried as high as 15 milliampères, while here the average is about ·5 to 1·5. This high current is, of course, used only for short exposures and for making radiographs of the abdomen. The results are most excellent. For instance, the outline of a kidney is defined very clearly by using a low vacuum tube and a very high current. We cannot do this by our methods, because our coils do not give us enough current; whereas the American worker gets an enormous quantity of low penetrating rays. The exposures given are twenty seconds at the outside, and much of the best work is done in five or six seconds.

The President's address was delivered on the evening of the second day by Dr. Hulst. His radiographs of the abdomen are among the finest of all I have ever seen. He uses short exposures, and his radiographs are made on plates which are large enough to take in the whole of the trunk. The President begins his work by giving the patient a Seidlitz-powder in separate parts in order to inflate the stomach, and takes a radiograph while the stomach is distended with gas; then he gives the patient a meal containing 1 or 2 ozs. of bismuth, and afterwards a radiograph is made of the stomach while the patient is in the upright position and also while lying on one side. Six hours afterwards the procedure is repeated. A radiograph taken the

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next day showed every one of the little folds of the colon as the bismuth gradually worked its way through the large intestine.

The question of X-ray measurement came in for a good deal of attention. All the methods with which we are familiar were discussed, and two of the members had fresh suggestions. In both of them the selenium cell was made use of. In the first method a selenium cell (which is a conductor when light falls on it, but if kept in the dark has a very high resistance to electric currents) and a very delicate milliampèremeter were used. Starting from this basis, Dr. George Johnson, the Secretary of the Society, encloses the selenium cell in a box, having one side coated on the interior with platino-cyanide of barium. When the rays are allowed to fall on this fluorescence is produced, and the light, acting on the selenium cell, renders it sufficiently conducting to allow of a direct reading on the milliampèremeter. In the discussion which followed Dr. Johnson's communication Dr. Dunham produced his scheme. He has a box which is divided into three compartments. In the one end is the selenium cell, in the opposite end an ordinary incandescent lamp, and in the middle a bottle filled with a two per cent. solution of iodoform in chloroform. Small holes are made in the partitions, and through these small holes the light from the lamp passes through the bottle on to the selenium cell. The bottle is placed on the surface which is to be treated, becoming claret-coloured, and from time to time is placed in the box again and another reading taken. Neither of these schemes, of course, is perfect, but both of them, I think, are free from a good deal of the objection which applies to others. In the first case the fluorescence of the platino-cyanide gives a good guide to the quantity of rays passing, though not to their penetration. After all, the quantity is the thing we want. Much the same thing applies to the iodoform and chloroform arrangement.

There were papers on every conceivable subject connected with Röntgenology. Mention must be made of the work of Mr. Caldwell, who was a visitor over here some time ago, on the Sinuses connected with the Nose. His stereoscopic photographs in illustration of the subject were excellent; indeed were perfect. His ideas were most original, and much was to be learned from his paper.

In conclusion I may mention one thing which impressed me very much. I have got rid of a good deal of that suspicion of anything in the way of medical work which emanates from America. I am fully convinced that there are men over there who are doing just as good work as we are doing, and are doing more work, because they have more opportunities. They get more encouragement than we do. The profession

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as a whole, and the public as a whole, support them. We suffer a good deal from our English conservatism. There was not a single bit of work shown before the Society which could be described in any way as worthless. The work there is perfectly genuine and worthy of the most serious attention. They have original ideas and plenty of enterprise. They thresh out a thing to the last degree. They have millionaires who endow laboratory research, and men at their service who are ready to carry out any new idea in the way of apparatus. They can constantly vary their technique. Thus they have many advantages over us; but I do not think that they can do better work than we can, so far as personal qualities are concerned, but I do think that they have better opportunities.

CORRESPONDENCE.

To the Editor of *Medical Electrology and Radiology*.

SIR,—I am very pleased to read the Editorial note in the current issue of the Journal on the value of the longitudinal reaction of Doumer in electrical testing. As a result of some considerable experience I have come to regard this as a most important reaction to look out for, particularly in all old-standing and severe cases, and I find myself placing more and more reliance upon it as time goes on.

It is not uncommon to find cases where no reaction can be obtained with the testing electrode on the motor point, but in nearly all of these a contraction can be obtained if the electrode is applied to the distal end of the muscle or to the tendon. I have already mentioned the importance of this reaction in another place,* and were I to re-write that chapter now I would emphasise its value still more.

Yours faithfully,

REGINALD MORTON.

22, QUEEN ANNE STREET, W.

* "Essentials of Medical Electricity," by E. R. Morton. Kimpton, 1905, page 126.

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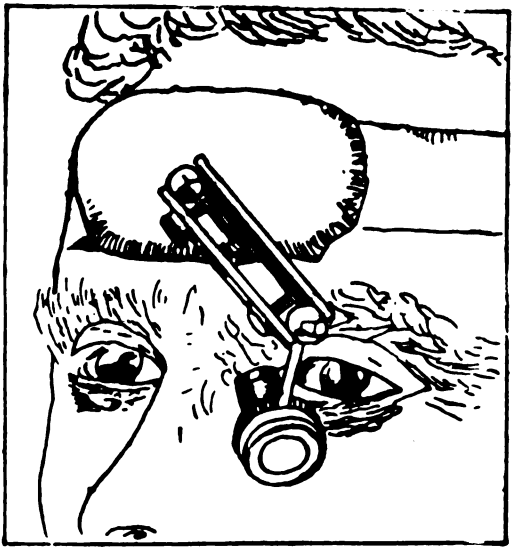
ON A NEW FORM OF RADIUM APPLICATOR.

By J. E. ADLER, M.R.C.S., L.R.C.P.,
House Physician in the Finsen Light Department of the London Hospital.

The accompanying illustration is a drawing of a new instrument for the application of radium.

Many operators find it convenient to use radium in small sealed glass tubes, and this instrument is devised to hold securely the tube or tubes in any required position.

The essential feature is a double ball and socked movement. Fixed to the patient, usually, but not necessarily, his forehead (by a longer band it can be applied anywhere) by means of an elastic or webbing band, is a plate—similar to that of the ordinary head mirror used in throat work; inserted into this plate is a pin with a ball at the end of it.



Another ball has tapped into it a pin, carrying a collar in which the radium tube fits securely by means of an india-rubber diaphragm. (This ring can be made of any size to take one or more tubes.)

A very free movement is obtained, the two balls working in cups in the side plates. The radium tube can be fixed in any position by tightening the side "milled nuts," there being two, one controlling each ball.

Besides ensuring the safety of the tube and its valuable contents (which has hitherto depended on the steadiness of the patient, and the tenacity of the strapping used to fasten the tube) the patient, with this instrument in position, is able to sit up, read, and move about without altering the relative positions of the tube and the area under treatment.

These are points which are not unimportant, as many of the patients are old, feeble, and restless, and the treatment with radium may mean an application for an hour at a time.

A removable pad is supplied, and the rest of the apparatus being nickelled can be sterilised with the greatest ease.

The instrument is made by Mr. T. Leach, 7, Exeter Terrace, Barking Road, East Ham.

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary.*

The Thirty-ninth Ordinary Meeting of the Society was held on Friday, October 26th, 1906, at 11, Chandos Street, W. Mr. CHISHOLM WILLIAMS (Vice-President) in the Chair.

Present: Twenty-one members and visitors.

The CHAIRMAN read a letter from Mr. Hall-Edwards stating that he would try to be present at the meeting, but that he was very far from well. This was followed by a telegram in which he regretted his inability to come. The Chairman expressed his sympathy with Mr. Hall-Edwards on behalf of the meeting, and hoped that his sufferings might soon be alleviated.

The minutes of the Provincial Meeting, held at Bristol, were read and confirmed, and it was stated that the following names had been only proposed and seconded for membership, and would come up for election at the next meeting: Dr. R. Knox, of Edinburgh; Dr. W. Mitchell, of Bradford; Drs. J. Goodwin Tomkinson, E. A. Boxer, A. G. Hay, and Robert Pollok, all of Glasgow.

Dr. W. IRONSIDE BRUCE then read a paper on "Extended Uses of X-Rays in Diagnosis."

In the discussion which followed Mr. A. D. REID said that he had been particularly interested in Dr. Bruce's experiments with regard to treatment of diseases of the kidney. That same evening he had been asked to examine a boy with a suspected stone. It turned out when radiographed that there was no stone to be found, and the doctor in charge of the case mentioned that he considered that hæmaturia was often wrongly attributed to stone in the kidney. Without going so far as to assert that crystals of oxalate could be the cause of hæmaturia, the doctor said that in his own case the eating of rhubarb was always followed by sharp hæmaturia. He (the speaker) had examined a good many cases of supposed stone in which no stone was found, but in those patients the symptoms usually passed away, patients came no more, and were presumably cured. This effect of rhubarb might be worth bearing in mind, especially with regard to children. At certain seasons of the year rhubarb was a very frequent article of diet among school-children and others.

He could not agree with the statement, quoted by Dr. Bruce from a medical journal, that all radiograms of the kidney were "fuzzy." A difficulty might occur with a

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nervous or with an infirm patient, owing to their inability to bear the application of the compressor, and this might account for some of the failures.

Another point worthy of remark was the ease with which a stone, whose shadow had been observed in the radiogram, might be missed at the operation. He had had three cases in which the radiogram had shown the presence of a stone, but the operation had not recovered it, although at a second operation a stone about the size of a pea had been extracted. Mr. Reid suggested that in cases of this sort it would be convenient to use a small sterilisable fluoroscope, about 2 inches by 1 in size, by the aid of which the surgeon could introduce a needle down on to the stone and extract it with only about half an inch incision. It had been a little difficult to get surgeons to realise the advantages of an X-ray examination in cases of renal calculus, and this was a reason why every precaution should be taken to ensure accuracy. It was worth while, if there was a doubt of any sort, to take a radiograph both on inspiration and expiration. Many failures to find a stone had resulted through lack of full investigation under both the different conditions of inspiration and expiration.

Mr. Reid mentioned a further case of a man who had two or three calcified glands which gave shadows resembling calculi in the ureter. With the aid of the stereoscope it was seen that the glands were in a plane remote from the ureter. Useless operations on the ureter were a calamity. In the case of a patient, suffering from acute kidney trouble, a very small quantity of pus was found in one ureter. The first radiogram showed a shadow 4 inches long and ¾ inch wide in the lower tract. It proved to be an ureteral calculus almost of the size and shape of a man's finger. If the kidney only had been radiographed, in that case the operation would have been without avail, and it served to emphasise the importance of radiographing the whole urinary tract. One could not feel safe unless one did that.

Dr. J. R. LEVACK said that he, too, had been much interested in the paper, the more so as Dr. Bruce was in some sort a pupil of his own, and like the last speaker he was specially interested in cases of stone in the kidney, and agreed with him as to the necessity of making a thorough investigation. In one case he was asked for a report on the condition of the right kidney. He first made a stereoscopic view of both kidneys and then took a skiagram of the ureters. He found no stone in either kidney, but a stone in each ureter; on one side it was at the entrance to the bladder and on the other 2 or 3 inches higher up. The lower one could be distinctly felt.

With reference to the skiagraphic appearances of rheumatoid arthritis and gout, he had not yet come across any

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hospital patient in Aberdeen whose joints showed signs of gout. He would, however, radiograph the hands and look into the matter more carefully.

The CHAIRMAN said that Dr. Harry Fenwick had long used a small fluoroscope in renal exploration in the way suggested by Mr. Reid. He considered that all X-ray workers were labouring under the disadvantage that the profession in general hardly realised the diagnostic value of X-ray work. Sometimes a radiograph—of a wrist for example—was brought back to him with a request that he would do it again, on the ground that it was not clear enough, although the want of sharpness might be the natural consequence of disease. Often he had been asked whether a joint showed signs of rheumatism or of gout, but Dr. Bruce's examples made the differences so striking and clear that he thought it would be a good thing if they were published for general information.

He would like to mention a useful application of X-rays for diagnostic purposes in connection with malignant glands. If before starting actual treatment of a case of suspected malignancy they would give an outlying gland one application of a good-sized dose of X-rays, and watch it carefully day by day for a week, they would find if it were malignant that the gland would harden, and the hardness would be of a peculiar character, quite different from the ordinary malignant hardness. An ordinary inflamed gland would, on the other hand, not harden, but would become larger and softer.

Dr. BRUCE, in reply to the questions raised, said that in the first case which he quoted in his paper the patient suffered from hæmorrhage but the disease was tubercular. In this case the hæmorrhage that did take place was observed to come out of the ureter on the affected side. Another point was that relating to nervous persons. He had been very much struck with this. As a rule one got much better results with the hospital patient than in the private cases, because he found the former class was more tolerant of the compression.

With regard to Dr. Levack's statement as to gout in Aberdeen he could tell a little story. A patient of whom he knew went to an eminent surgeon in Harley Street. "No doubt you are suffering from gout due to too much indulgence in meat," was the verdict. "I shall have to ask you to give up meat entirely." "But I have never eaten meat in all my life," was the patient's reply.

He (Dr. Bruce) once took a radiograph of the hands of an old farmer who had the most extraordinary gouty deposits he had ever seen. Yet he only ate meat once a week and was a most abstemious man. He did not think the cause of gout was necessarily connected with food.

The question of bad radiograms had been mentioned by

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the Chairman. He had lately been asked to prepare some radiograms of bone disease and knew how difficult it was to produce prints which would satisfy the surgeons.

Dr. REGINALD MORTON then made his communication on X-ray Work in America, giving an account of his visit to the Annual Meeting of the American Röntgen Ray Society, held at Niagara Falls, N.Y., on August 29th, 30th, and 31st.

After the reading of the paper the CHAIRMAN said that he thought the greetings which had been sent to the Society should be placed upon the minutes, so that some official record of the expressions of goodwill should be kept. He also thought that the thanks of the members were due to Dr. Morton for the energetic manner in which he had discovered for their benefit what the Americans were doing. The question of exchanging the transactions was not easy to settle at the moment as they did not yet know what would be the upshot of the proposed amalgamation with other London societies, and the future of the British Electro-therapeutic Society was therefore uncertain. There was no doubt that by getting the transactions the members would be the gainers, for much practical knowledge could be obtained from the Americans, who had so much greater opportunities than their British co-workers.

Dr. Morton had given an admirable account of his visit, but he (the speaker) did not think that with any apparatus he ever had he could usefully employ more than 2 or 3 milliampères of current in any X-ray tube. He would like to go in for one of those huge coils, but one had to alter one's whole apparatus in order to experiment in that way.

Dr. W. IRONSIDE BRUCE said that the trouble was that none of their ordinary tubes would stand such an enormous current as the Americans used. It was possible, indeed, to use a high current, but the tube would suffer. With regard to the selenium cell, the Sanger-Shepherd firm, who had very keenly followed up the measurements of ordinary light for the purpose of a machine of theirs, had tried to use selenium but found it difficult to work with, because it took so long a time to recover. It was apt to decrystallise and become useless, so affecting the milliampèremeter that it was difficult to recognise any changes that took place.

Mr. REID asked whether Dr. Morton had any idea as to the cost of the large coils. He was anxious, too, to know about the tubes, in particular as to their size, whether the Americans favoured large tubes or not.

Dr. W. DEANE BUTCHER said that the work in America had interested him because it coincided with his own observation of the work in Germany. The only difference between English work and that of Germany and America was that we were afraid of expense. In Germany and America

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they thought nothing of spending £500 or even £1,000 on a laboratory. The enormous currents, of course, involved considerable wastage of focus tubes. He was in Germany recently and was radiographed by a colleague. When he asked for a further examination he found that his colleague had already wasted two tubes (costing about £5) on him, and thought nothing of it. It was an instance of the fact that the German worker was not continually harassed by the fear of overstepping the limit in regard to expense. He saw that St. Bartholomew's Hospital was going to set up a new electric department, and expressed the hope that it would be worthy of such a rich institution. In view of the imperfect apparatus and lack of financial resource which the British worker had to combat, it was wonderful that such good results could be shown. If the results in Germany, poor country as it was, were better than those in England it was due not to lack of earnestness but to lack of opportunity.

Dr. H. McCLURE endorsed Dr. Morton's remark about the unbounded hospitality of the Americans and their great earnestness. He considered that they were more earnest than we. The best scientific work in the present day was being done in America, and the finest university in the world was that of Chicago.

The CHAIRMAN said that he wished Dr. Morton would give them a hint or two about the exposures of the tubes. He thanked Dr. Morton on behalf of the Society.

Dr. MORTON, in reply to Dr. Bruce, said that his remarks about the wastage of the tube were quite true up to a certain point. But we in this country set to work in a wrong way. By the American method not only was the resistance of the secondary enormously increased but the impedence of that part was increased too. It was possible to choke the output so long as the secondary coil was built with fine wire—thirty-six standard wire gauge—and a large number of turns put on. At the present time he had at the London Hospital for an 18-inch spark 50 lbs. of wire on the secondary, and now, when working with tubes whose resistance only corresponded to an alternative spark gap of 4 inches, no more than 2 milliampères could be got through. The primary was constructed for 12 volts, and he was using 60 volts on the coil with the mercurial dipping contact break. The Americans had scored a distinct point in using a large size of wire and supplying an enormous magnetic flux. The wastage of tubes was not a matter which greatly concerned them. Even if a worker did sacrifice a couple of tubes over one case he did not greatly mind, for in the result he would be paid for them over and over again. The secret of success in using the high current, however, lay in the shortness of the exposures given. He did not know that the Americans

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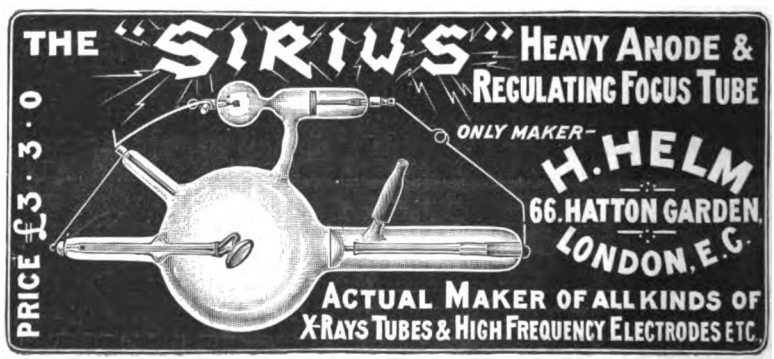
got any greater amount of energy out of their tubes in the long run, but they got it out at a faster rate. Judging from the exposures and the currents used the energy seemed to rise at a greater rate than that at which the current increased. With regard to the selenium cell the weaknesses which had been pointed out were mentioned in the course of the discussion.

In reply to Mr. Reid, so far as he (Dr. Morton) could make out, the approximate cost of a coil of 15-inch spark was 175 dollars (£35). Of course they could not be obtained over here. If they could be they would revolutionise the whole business. The American makers said they had got plenty to do in meeting home demands without seeking business abroad at present.

The compressor diaphragm was really going out in America. With the tubes they could get excellent results in a short time without it. They asked their patients to hold their breath for a moment, and the most nervous of patients could do that. The tubes were about 6 inches in diameter. Very large tubes were not popular. The exposures, about which the Chairman had asked, were sometimes very short. Dr. Pancoast, of Philadelphia, got his kidney radiographs in ten seconds or less. The tubes were simple in form like those to which English workers were accustomed.

The CHAIRMAN, in closing the meeting, announced that the Annual Exhibition would be held in the small Queen's Hall on December 14th, and the next ordinary meeting of the Society would be on November 23rd.

The proceedings then terminated.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MEDICAL

Electrology and Radiology.

No. 12. DECEMBER, 1906. VOL. VII.

PROGRESS IN 1906.

The year now closing has not yielded any startling discoveries in electrotherapeutic practice, but there has been steady progress in many directions. In Radiography the instrumentation continues to improve, and with this there is a concurrent improvement in X-ray practice. Particularly this is the case in the exploration of the kidney, and it should not be long before the detection of small renal and ureteral stones becomes a matter of comparative ease. The writings of A. D. Reid, of E. W. Shenton, and of Ironside Bruce, which have appeared in the columns of *Medical Electrology and Radiology*, have all contributed to a simplification of this difficult branch of radiography.

The use of a couch with the tube beneath it is growing more and more into favour with radiographers, and not the least of its advantages is the fact that it permits of a final fluoroscopic survey of the area to be photographed and enables the condition of the tube and the pose of the patient to be verified immediately before the exposure of the plate, a procedure which conduces very greatly to a successful result.

The admirable little book of Walsham and Orton on the X-ray Examination of the Chest, recently reviewed in these pages, should serve to popularise this branch of work, and to inspire a more general confidence in the method on the part of physicians in general. Signs are not wanting of a tendency in this direction.

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The advantages of the diaphragm, with or without a compressor, are now acknowledged, and this simple accessory, like the rectifying valve tube, is, or should be, of universal adoption. The development of the ortho-diagraph and its conversion into a practical instrument for the systematic measurement of the chest and its contents should hasten the employment of X-rays by general physicians.

The confirmation of the discovery of the relationship between cervical ribs and a special form of atrophy of the intrinsic muscles of the hand can also be placed to the credit of the radiography of 1906.

Numerous other practical applications of radiography to the diagnosis of diseases of the nervous system have been indicated by W. Furnröhr in his recent work.*

The chronic dermatitis of operators is becoming less painfully apparent. Its close connection with screen examinations is now manifest, as witness the not uncommon immunity of the thumbs when the rest of the fingers are badly affected, this being clearly connected with the relative positions of the thumb and fingers in the action of holding up the fluorescent screen. The use of a diaphragm protects the fingers very much in screen work, but gloves, and screens fitted with shields should always be made use of in fluoroscopy, if dermatitis is to be kept at bay.

In X-ray therapeutics the general adoption of the pastilles of Sabouraud and Noiré, with the resultant boldness of operation, and the diminution of the number of applications are among the noteworthy events of the past twelve months. The fields of practice which are opening out in several directions, as, for instance, in the treatment of strumous glands, and of exophthalmic goitre by X-rays deserve further study.

In high frequency practice the treatment of arterial hypertension has occupied the chief place during the year.

In the medical applications of direct and alternating currents the feature of the present time is electrolysis in its uses in connection with the transport of ions. The ionic

* Die Röntgenstrahlen im Dienste der Neurologie. Berlin. 1906. S. Karger.

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treatment of rodent ulcer by zinc electrolysis may be considered secure, at least for small rodent ulcers, and the applications of ionic medication to ringworm, to lupus, and perhaps to other superficial or local morbid processes is worthy of much effort.

Our readers will be glad to learn that there will be an Electrical Section at the forthcoming annual meeting of the British Medical Association, and that Prof. Stéphane Leduc has promised to deliver an address at the opening of the Section. The prospect of listening to an address given by Prof. Leduc should ensure a good attendance, and we can assure all those who are interested in electrotherapeutics that there is a treat in store for them, if they will avail themselves of it. The date of the meeting is July 29th and the following days. The officers of the Section, nominated so far, are as follows:— *President:* H. Lewis Jones, M.D., London; *Vice-Presidents:* J. Delpratt Harris, M.D., Exeter; C. R. C. Lyster, M.R.C.S., London; W. C. Wilson, M.D., Plymouth; *Hon. Secretaries:* Ellis Pearson, F.R.C.S.E., Bideford; E. W. H. Shenton, M.R.C.S., 126, Harley Street, London, W.

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UNUSUAL FRACTURE OF THE FIFTH METATARSAL BONE.

By GEO. H. GRAHAM, M.D.

I have ventured to bring this case before the Society as the fracture I am to speak of is one that is practically never diagnosed without X-rays, notwithstanding the fact that the bone is so superficial.

Fractures of the metatarsal bones due to causes other than direct violence are sufficiently uncommon to justify recording when a case presents itself. Direct violence is usually the cause of these fractures and frequently involves severe damage to the soft parts, when the surgical consequences may be serious. If the fracture so caused is simple and is recognised the injury is of little importance, proper treatment being adopted. But when no violence has been received, and there seems little or even no cause for a fracture to occur, the injury, being unsuspected, is liable to be overlooked, and the patient, instead of keeping at rest, walks about, partially disabled, suffering much pain for a long period. Such cases, according to von Bergmann, may ultimately cause permanent partial disablement.

A clergyman, about 50 years of age, whom I have attended for some years, consulted me on September 29th this year for a pain on the outer side of his right foot. He informed me that on August 10th, while walking on a gravel path and wearing ordinary shoes, he felt a sudden pain after he had been walking from twenty to twenty-five minutes. He had not twisted the foot nor been jumping at the time. Shortly afterwards he seemed to feel something slip at the site of pain, but felt no grating. The pain increased greatly in severity as he walked home, which he reached with difficulty. He was treated with lotions and partial rest under medical advice. Two or three days after the injury he had a slight attack of gout in the great toe of the same foot, but this soon passed off. He experienced no relief from the pain on walking till about five weeks later, when he bound his foot round with plaster.

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On examination I found over the base of the fifth metatarsal a distinct enlargement when compared with the other foot; somewhat painful on pressure, but hard and obviously bony. No crepitus could be felt. Being uncertain as to the cause I made an X-ray screen examination, which diclosed a transverse fracture of the tubercular eminence at the base of the fifth metatarsal. The skiagram shows marked separation of the fragment with little or no attempt at bony union.

On closer examination, after the X-rays had shown the nature of the injury, a very slight groove could be made out over the site of the fracture.

The cause for such a fracture occurring without any violence, in an apparently healthy man, while simply walking, is not very clear. The patient had never previously

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broken a bone, he showed no evidence of tabes or any other nerve lesion. Myeloid changes were, as far as possible, excluded by an examination of the urine. Mr. Eastes reported on a specimen that it "contained a most minute trace of serum albumen, but none of the tests employed showed the presence of albumose." In the absence of any inversion of the foot or any undue strain it is difficult to believe that the action of a comparatively weak muscle, such as the peroneus brevis, would be sufficient to cause such a fracture.

The literature on the subject, as far as I have been able to discover, is very limited; the large majority of authorities briefly dismissing it with the remark that such fractures are due to direct violence. Tobold, however, reports many cases in soldiers from prolonged marches, jumping, etc. Von Bergmann agrees that the condition is one more frequently met with in soldiers, and considers that the heavy knapsack they carry has some bearing in this connection. He mentions that in more than 90 per cent. of the cases reported the break was in the middle of the second and third metatarsal and never in the first. He further states that with the X-rays, Schulte, Stechow, and Kirchner found that what Breithaupt described as "tumour of the foot" was due to the fracture of a metatarsal bone (the majority being incomplete greenstick fractures), produced generally by slight violence and usually overlooked at first owing to the slight disturbance occasioned. Robert Jones reported the fracture of his own fifth metatarsal near the base while dancing, and four other cases from some slight indirect violence. In all these cases, as shown by the skiagrams published, the fracture is anterior to the base, some being nearly in the centre of the shaft. He explains the fractures in his cases thus: "When the heel is off the ground the body-weight expends itself upon the fifth metatarsal, rotating it slightly inward. The opposition to this force takes place at its base, where the strongly attached ligaments resist its displacement. A fracture occurs therefore exactly where our skiagrams illustrate": *i.e.*, anteriorly to the base. It will be observed that in the case now reported the fracture involves the articulation with the cuboid and has

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broken off only the tubercular eminence, where it would seem there should be little or no strain, with no inversion of the foot occurring at the time. Jones lays stress on the difficulty in diagnosis of these cases without X-rays as crepitus is, in the majority of them, unobtainable.

Whitman alone among the authorities I have consulted states that the injury may occur without apparent cause other than walking, and that the pain and swelling may be inexplicable without X-rays, but he gives no instances nor any explanation for a fracture thus occurring.

Each of the outer four metatarsals are developed from two centres, one for the shaft and the other for the digital epiphysis, but it is interesting to note in connection with this fracture that Kirchner has described, in a recent number of Langenbeck's *Archives*, a special epiphysis at the proximal end of the fifth metatarsal for that portion that forms the tubercular eminence.

A point of commercial interest in the case (and we all have to consider such matters on behalf of our patients) emphasises the necessity of a prompt X-ray examination. The patient was insured in an Accident Insurance Company, but his careful forethought and provision availed him nothing, owing to the injury being unrecognised.

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THE TREATMENT OF WARTS (VERRUCA) BY MAGNESIUM IONS.

By H. LEWIS JONES and J. M. FLAVELLE.

(From the Electrical Department, St. Bartholomew's Hospital.)

On several occasions in recent years there have been references in the medical Journals to the treatment of warts by magnesium sulphate, either locally applied or administered by the mouth, and it therefore seemed to be interesting to try whether the electrolytic introduction of magnesium ions had any effect upon this condition.

The following cases seem to support the view that there is some specific action of magnesium upon warts, particularly upon the multiple warts, which often occur upon the backs of the hands.

Case 1.—M. G., female, aged 36, was referred to the Electrical Department in July, 1905, with very numerous warts, covering the dorsum of the right hand. A pad wetted with a solution of magnesium sulphate, of the strength of 20 grains to the ounce, was applied to a circular area on the back of the hand, and current was applied, the positive electrode being in contact with the pad of lint. The total current was 5 milliampères, and the duration of the application fifteen minutes. A week later a similar application was made of 8 milliampères for fifteen minutes, and on her next visit, a fortnight from the date of the first application, the note was made that the warts, which were very numerous, had practically disappeared, leaving only a few shrivelled remnants of their former presence.

Case 2.—M. W., female, aged 12. Numerous warts of the dorsum of the right hand, of the neighbouring parts of the fingers, and of the wrist. They had been present for a year.

The solution of magnesium sulphate was applied with the positive pole as in the previous case on September 18th, 1905. Certain of the warts were intentionally left untreated. The application was again made on October 3rd, and a careful note made of twelve warts on the dorsum of hand, which received a full application, owing to their being well covered by the lint and the electrode. Six others on the knuckles also

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received a moderate dose. On November 17th the untreated warts were but little altered, but of the eighteen specially noted nothing could be seen except shrivelled remnants at the site of four or five on the knuckles, all those on the dorsum of the hand having vanished.

Case 3.—J. B., male, aged 14. When seen on September 25th, 1906, he had an abundant crop of warts on the left hand, and treatment was applied by the immersion of the whole hand in a jar of magnesium sulphate solution connected to the positive pole, the circuit being completed through the body of the patient in the usual way. The same process was repeated on October 1st and October 8th, but, no obvious effect being apparent, two selected warts were treated by direct applications on October 15th. An electrode of metallic magnesium covered with lint dipped in magnesium sulphate solution was applied to a single large wart, while a zinc electrode similarly covered and wet with zinc sulphate was simultaneously applied to another; both were made positive, and each received 2 milliampères for fifteen minutes.

On October 22nd the wart treated with magnesium had disappeared, and the patient said that it "fell off" on October 17th. The wart treated with zinc seemed not much changed. The other warts were then treated with magnesium sulphate, and by November 12th all had disappeared, except the one to which zinc had been applied. This persisted, but appeared rather dry and shrunken. After treatment with magnesium it also disappeared.

Thus the multiple warts occurring in these patients reacted very well to the magnesium ions. A case of solitary hard wart in another individual has not been much affected by treatment of the same kind.

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NOTES AND ABSTRACTS.

On the Production of Sustained Electrical Oscillations of High Frequency.—The brilliant demonstration given by Mr. Valdemar Poulsen recently has called fresh attention to the possibility of producing sustained high frequency oscillations, and our readers may therefore be glad of some notes on the subject. In the first place it may be mentioned that the oscillations produced by the medical high frequency apparatus occur in the form of groups of oscillations with comparatively long intervals between one group and the next, while the amplitude of the waves composing each group is less and less with each successive wave, so that the oscillatory disturbance rapidly grows weaker and dies away.

In 1899 W. Duddell described a method of producing sustained oscillations up to 30,000 or 40,000 per second, but the amount of energy available in the form of the waves was low, and the rate of oscillation was also rather low. Duddell's method was comparatively simple, and it consisted in the arrangement of a condenser and an induction coil in series with each other, the combined system of coil and condenser being placed as a shunt to an electric arc lamp. Under these conditions the arc emits a musical note and the induction coil is traversed by an alternating current. Poulsen, by elaborating Duddell's apparatus, has succeeded in reducing the expenditure of energy in the arc and in obtaining a very much larger part of the applied energy in the coil. This he has accomplished through discovering that an arc immersed in an atmosphere of hydrogen can give a million or more vibrations a second. If the arc in hydrogen be placed in a strong magnetic field, the potential difference of the electrodes may be very high in proportion to the length of the arc, 440 volts, for instance, corresponding to a length of arc of 3 millimetres. In these conditions the energy appearing in the form of an alternating current is considerably increased, and further the application of the magnetic field was proved experimentally to increase the general efficiency of the system. The effect was also increased by using in the arc an anode of copper and a cathode of carbon. The result of these changes was such as to enable Mr. Poulsen to exhibit some very striking experiments of the kind with which medical men are familiar in connection with high frequency apparatus, but with the difference that the amount of energy appearing in the high frequency circuit was considerably greater, so that, to give one instance, he was able to melt a thick copper wire ring by holding it near the end of the high frequency solenoid.

Poulsen's paper will be found with illustrations in

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the *Electrician* for November 16th, and in the next number of the same Journal (November 23rd) there is a short note which seems to suggest the possibility of a method of producing sustained oscillations which might be more convenient for medical applications than the somewhat complicated arc in hydrogen of Poulsen. The note in question is by Mr. S. G. Brown, and describes a method of producing continuous high frequency oscillations by substituting for the arc a loose contact between a rotating disc of aluminium and a copper block in contact with its edge. Mr. Brown writes that this moving disc arrangement can be worked for several hours continuously on direct current at 200 volts, and that the curcuit containing the condenser and the induction coil arranged in shunt to the contact is the seat of a current of considerable magnitude, and has a frequency which may be of the order of a million per second.

The Theory of the Ions in Pharmacology.—S. Leduc in a course of lectures, which have recently appeared in *La Presse Médicale,* has pointed out that pharmacological effects depend very largely upon the ionic groupings of an element. After comparing the different effects of arsenic in the two forms of arsenious acid and of cacodylic acid, and of phosphorus in the free state and when combined to form phosphoric acid, he refers to the work of Paul and Kronig in connection with the bactericidal effects of different mercuric compounds. In a comparison of the effect on anthrax spores of solutions of mercuric chloride, bromide, and cyanide, containing equivalent quantities of mercury, it was found that the first-named salt acted five times as powerfully as the bromide, while the cyanide was comparatively inert. Leduc points out that these differences are simply differences in the degree of dissociation of the salts, and that whereas the mercuric chloride solution dissociates fairly well, so that its solutions contain abundance of the active mercuric ions, the degree of dissociation of the bromide is considerably less, and of the cyanide hardly any at all.

The Treatment of Tabes by Mercurial Injections.—S. Leduc, continuing the same chain of reasoning, has the following significant remarks on the treatment of tabes. He tells us that the lessons learnt from bacteriological investigations throw light upon the therapeutic effects of mercurial compounds, and should enable us to avoid certain errors in their administration. Whereas it has been the custom to employ mercury without regard to the particular salt of the metal to be preferred this point should be considered to be of capital importance. He writes as follows: We have made indiscriminate use in treatment of many salts containing mercury, sometimes choosing organic compounds which are incapable of dissociation, and sometimes using compounds in which

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the mercury forms part of a complex ion, and has therefore lost all its original properties. A chief object in the selection of such compounds has been the avoidance of pain in the injections, but the painful effect, like the bactericidal action, seems to be intimately connected with the presence of free mercuric ions, upon which too the therapeutic effect appears to depend, and in some of the proposed methods of treatment by mercurial injections the pain is only avoided by sacrificing the efficacy. Consequently the utility of mercurial treatment in tabes has been questioned.

By the addition of sodium chloride to the mercuric chloride solutions the coagulating action of that salt upon the muscles is reduced, and at the same time the painful effect is diminished, as the sodium chloride reduces the degree of dissociation until it has passed away by diffusion into the surrounding tissues, though ultimately the action of the mercury takes place as though no salt had been added. A better way of reducing the pain produced by sublimate injections is to use them in a more highly diluted state, and to use a solution of one part in 500, in preference to one of one part in a hundred, and to increase the bulk of the injection proportionately, or, better still, to use a solution which is still weaker. He advises the use of a solution containing 10 centigrammes of mercuric chloride and 1 gramme of sodium chloride in 100 grammes of distilled water, and to inject from 10 to 20 cubic centimetres at a dose, the injection to take two minutes to administer.

PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by REGINALD MORTON, M.D., *Secretary*.

The Fortieth Ordinary Meeting of the Society was held on Friday, November 23rd, 1906, at 11, Chandos Street, W., Mr. J. HALL-EDWARDS (President) in the Chair.

Present: Fifteen members and visitors.

The minutes of the Thirty-ninth Ordinary Meeting were read and confirmed, and the following new ordinary members were elected: Ernest A. Boxer, L.R.C.S.Edin.; Thomas Walter A. Daman, M.A., M.D., C.M.Edin.; A. G. Hay, M.A., M.D.Glasg.; Robert Knox, M.D.Edin., M.R.C.S. Eng.; William Mitchell, M.B., C.M.Edin.; Robert Pollok, M.B., C.M., F.F.P.S.Glasg.; W. R. Stowe, M.R.C.S., L.R.C.P.; J. Goodwin Tomkinson, M.D.Glasg.; William Vernon.

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Dr. H. Lewis Jones, M.A., then opened a discussion on the Report of the Organising Committee for the Union of Medical Societies of London. Dr. Jones said that all that he had to bring before the Society was embodied in the Report sent out with the notices of the meeting. He has acted as delegate of the Society during the past year at the meetings of Representatives of the Medical Societies called together to consider the question of amalgamation. At the last meeting of the General Committee of Representatives in July the Report of the Organising Committee was adopted. That was now in the hands of members and he would deal with it first. Omitting the central part of the Report, in which the financial possibilities of the new situation were discussed, the remainder could be explained in a few words. The new body would be, briefly, a Society with a number of Sections. In conjunction with Dr. Reginald Morton he had endeavoured to ensure that electrotherapeutics should be adequately represented in the new Society. He was glad to say that it was proposed to give the subject a separate Section, to be called the Electrotherapeutic Section for convenience, although it was recognised that that title might not completely express all the applications of electricity to medical practice. He might add that the feeling at the Representatives' meeting seemed to be that Sections might be abandoned if it was found that the attendance or the work done in them was unsatisfactory. If the scheme for the Union of the Medical Societies went through he hoped that members of the British Electrotherapeutic Society would do their best in their new capacity to ensure that the Electrotherapeutic Section was a success.

The rules and constitution of the New Society would be finally settled by the representatives of the joining Societies as soon as answers had come from the various Societies interested, and the representatives would form the first Council of the New Society, and each Section would draw up its own regulations for the management of affairs in that Section. With regard to membership, all members of a Society taking part in the amalgamation, who desired to do so, would become original members of the Corresponding Section, and might also become Fellows of the New Society without election, if they desired to do so, and paid the full subscription of three guineas, but members of a joining Society could not become members of other Sections except by being duly elected members of such Sections after the formation of the New Society. An original Fellow of the New Society would not have power to vote on matters affecting the internal affairs of any particular Section, unless he were an original member of that Section, or had been elected to it after the formation of the New Society. Thus any person who be-

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longed to, say, three Societies which were all joining would automatically become a member of the three corresponding Sections but not a member of any other Sections, even if he became a Fellow.

Their Society had now to decide whether the Report of the Organising Committee which they had before them was a satisfactory basis upon which to proceed to amalgamation, and whether they were prepared to instruct their representative to proceed to draw up the rules of the New Society in conjunction with the representatives of the other joining Societies, in accordance with the general idea set forth in the Report before them. He thought that it would be safe to trust to the sense of the representatives and to give them discretion to arrange any points which might arise. He did not think that exception need be taken to the proposed title of the Electrotherapeutic Section, and they would have the management of the internal affairs of their Section in their own hands. He moved as a resolution:

> "That the British Electrotherapeutic Society shall instruct their representative to accept the general tenor of the rules as foreshadowed in the Report of the Organising Committee, with any amendments adopted by the general body of representatives of the Societies in their capacity as the Council of the New Society."

Mr. CHISHOLM WILLIAMS formally seconded the resolution.

The CHAIRMAN said that he had been unable to attend the last two or three Council meetings, but he understood that if members decided to amalgamate the name of the British Electrotherapeutic Society would cease to exist. They would only be a Section in the New Society. He asked whether the Journal could still be carried on.

Dr. LEWIS JONES said that, if it was desired, they could carry on their Journal as hitherto, but that it would not be the official organ of the Electrotherapeutic Section of the New Society.

Dr. E. H. GRAHAM asked where they would be housed. He saw that the Medical Society was standing out, so that they could not retain their rooms in Chandos Street.

Dr. LEWIS JONES said that he would make an enquiry on that point, but that there was ample room at 20, Hanover Square.

Dr. DONALD BAYNES asked how many Societies were standing out.

Dr. LEWIS JONES said that he understood that the Medical Society was standing out, as well as one or two smaller societies.

Continuing, Dr. Jones said that the paragraph which dealt with Journals was as follows: "Societies which own or partly own Journals shall make their own arrangements with

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regard to these quite apart from the question of amalgamation." They would receive a certain amount of space in the Proceedings of the New Society, and the papers would be reported. If they desired to keep their own Journal in addition they would have to pay for it by individual subscription, and the cost of it at present worked out at about 9*s*. 6*d*. per head per annum.

Dr. STANLEY GREENE said that he was not quite clear as to the financial arrangements. On what basis was it decided how much should be allotted to each Section? And how much was covered by the yearly subscription of one guinea?

The CHAIRMAN said that he understood that the 9*s*. 6*d*. per head would not have to be paid for the appearance of the papers in the Transactions.

Dr. LEWIS JONES said that for a guinea a year they entered into membership of the Electrotherapeutic Section of the New Society, had rooms found for them, and attendance and light for which they had now to pay. Their expenses would be included in the general expenses. They lost their Journal. They would have no Journal unless they decided to try and keep it under the present conditions, for which they would have to pay 9*s*. 6*d*. per head. They would, however, get the Transactions of the New Society, which would include a record of their work and the work of the other Sections. The Secretary, too, under the new arrangements would be relieved of a great deal of clerical work.

Mr. CHISHOLM WILLIAMS pointed out that on page 19 of the Report it was set forth that "the Proceedings shall contain as full a record as possible of the Society's work during the previous month, and individual papers shall be condensed only with the sanction of the Council of the Section before which they have been read." This meant that their own Council would do the pruning. If it was left to the General Council they might object to the length of some of their papers, and, equally, their Section might object to the length of some of the papers of other Sections.

He added that, so far as the Council was concerned, they were quite unanimous on the matter and favoured the amalgamation.

Dr. G. H. GRAHAM asked whether they would be able to hold an exhibition.

Mr. CHISHOLM WILLIAMS said that he did not think they would be able to hold a separate exhibition. Their work would be included in the general work of all the Sections, and in this respect they would gain, inasmuch as their aim had always been to educate the profession.

Dr. DONALD BAYNES asked whether there was any suggestion as to the name of the New Society. So far as their Society was concerned they were more medical than surgical, and yet it seemed to him they were going to get into surgical hands.

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Dr. LEWIS JONES said that the New Society would have a new title—possibly that of the Academy of the Medical Sciences—so as to bring it into line with similar societies in foreign countries.

He added that he thought they must be prepared to sacrifice something in order to advance their special work and to see it placed in a dignified position in the medical world, and for that reason they should be ready to support the formation of an Electrotherapeutic Section in the New Society. He thought that they ought to welcome the amalgamation scheme. That seemed to be their true duty as a Society founded for the advancement of Electrotherapeutics.

The CHAIRMAN said that personally his only misgiving was with regard to the loss of the name of the British Electrotherapeutic Society. He felt that they were parting with a good friend. If they found themselves left in the lurch, or if the new arrangement did not work smoothly, it would be difficult to start again as a separate society. It appeared to him that as a Section they would not have such a hold upon the medical world as they had now. There had in times past been a tendency to put a damper on electrotherapeutics, and although that feeling had to some extent been removed it would be very awkward if, once within the pale of the New Society, the damper were to be let down again.

The resolution was then put to the meeting and carried *nem. con.*

Dr. LEWIS JONES asked whether it was the wish of the members that he should continue to act as their representative at the meetings which would shortly be called.

The CHAIRMAN said that he was sure they would be unanimous on that point. Hitherto they had had two representatives, but for subsequent meetings and to serve on the first Council of the New Society it was requested that only one representative should be nominated. In the name of the members he thanked Dr. Lewis Jones and Dr. Morton for their services, and proposed that Dr. Lewis Jones should continue to act as their representative.

The motion, on being put to the meeting, was carried unanimously.

Dr. G. H. GRAHAM then read Notes and showed a Radiograph of an Unusual Fracture of the Fifth Metatarsal Bone.

Dr. REGINALD MORTON also showed a Radiograph and read Notes of a similar case sent by Dr. Charles J. Heaton, of Westgate-on-Sea. The fracture was of very much the same kind as in Dr. Graham's case, but it was caused by direct instead of indirect violence, a horse having trod on the foot of the patient. The recovery occupied a long period, and it was only after five weeks' suffering that the patient was brought for X-ray examination and the fracture discovered.

The CHAIRMAN expressed the thanks of the meeting to

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Dr. Graham and Dr. Heaton. He thought that the radiographs simply pointed to the value of radiography in all examinations for supposed fractures, and to the fact that in all cases of pain the foot should be radiographed from two or three points of view. Many fractures were overlooked because the cardinal signs of fracture were not present, and because the surgeon could not get crepitus. Some time ago he (the Chairman) read a paper before a provincial society on the subject of Obscure Fractures, particularly with regard to those longitudinal fissures which occurred in the lower end of the radius and the lower end of the tibia. He mentioned one case in which there was a split in the tibia extending to the distal end of the bone. This case was exhibited at one of the meetings of the British Medical Association, and the cause of the peculiar deformity was not discovered until the case was radiographed. He laid stress on the great use of X-rays in diagnosis, mentioning specially the book on the subject recently published by the *Practitioner*. It was already in its second edition and he hoped to see it in its twentieth.

Mr. CHISHOLM WILLIAMS said that most surgeons could show many fractures of the metatarsal bones, even of the fifth bone. The rarity of Dr. Graham's case lay in the fact that the fracture was caused by indirect violence. The fracture of these bones by direct violence was a fairly common injury, but there were very few cases, at all events in patients below the age of 50, of indirect violence as the cause. He understood that Dr. Graham's patient was a man of about 50.

Dr. GRAHAM said that he had nothing to add to the discussion except to repeat that his was a case of indirect violence and there was no external evidence of any injury. He would have liked to have heard some explanation of the mechanism of the fracture.

Dr. DONALD BAYNES had been announced to show and demonstrate a new form of electrical apparatus but the makers failed to deliver the instrument in time. He explained that it was practically a new form of apparatus, with a special method of winding the primary wire on the iron core.

Considerable informal discussion ensued, especially with regard to Dr. Baynes's statement that with this arrangement it was possible to take X-ray photographs without a tube. In reply to the questions of those who had not been able to comprehend the description of the apparatus, Dr. Baynes said that it was operated in the ordinary way by currents of electricity from the main, that it had an interrupter and gave a spark discharge, and that the photograph was taken by putting the plate on one of two metal discs, and bringing the hand or other part which it was desired to photograph into proximity with the other and near the first one.

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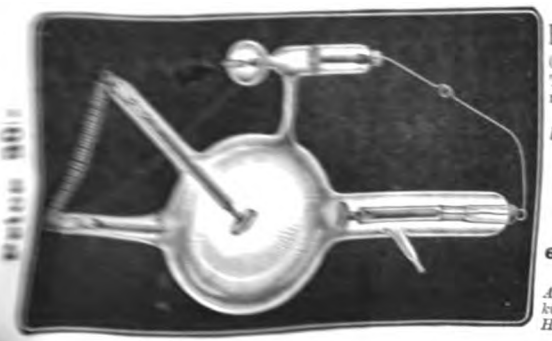
Before the business of the meeting was concluded the Chairman announced that the British Medical Association had already made arrangements to hold an Electrotherapeutic Section at their next meeting at Exeter. (Cheers.)

The Dynamic Syndicate.

Dr. Donald Baynes arranged a visit to the works of the "Dynamic Syndicate," on Mitcham Common, on Wednesday, November 28th, to see the apparatus which he had endeavoured to describe at the meeting of the British Electrotherapeutic Society on the 23rd. The visitors were received by Mr. Lacey, who first showed them an electro-magnet and two electro-motors. It was claimed that stronger magnetic effects had been produced by winding the electro-magnet and the field magnets of the motors in a peculiar way, and the mode of winding, as described by Mr. Lacey, seemed to consist in a reversal of the direction of winding in some of the layers of the wire! The visitors were not able to verify the arrangement of the wires. Subsequently some experiments were shown of the effects observable in an electro-static field between two metal plates attached to the terminals of an induction coil in action, and it was stated that X-ray photographs could be taken in the electro-static field so produced without the need of an X-ray tube. The visitors did not witness the actual taking of an X-ray picture, but were shown a couple of prints of the hand showing the bones. These were by no means of good quality, and were negative images on what appeared to be some form of printing-out paper. Negative images of other objects, such as instruments inside their cases, were also seen; the visitors received the impression that these had been taken in the manner described. The primaries of the induction coils used were stated to be wound in accordance with the principle of the inventor, namely, with some turns in one direction and some in the other. The induction coils were of very inferior quality.



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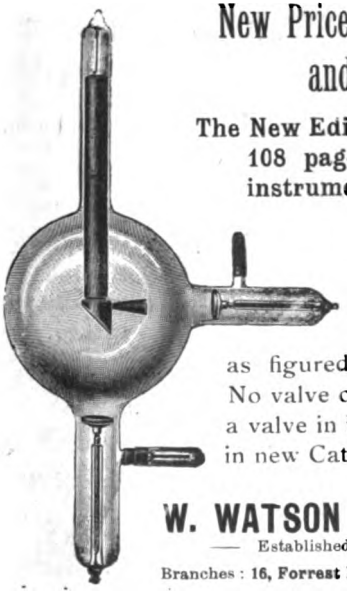

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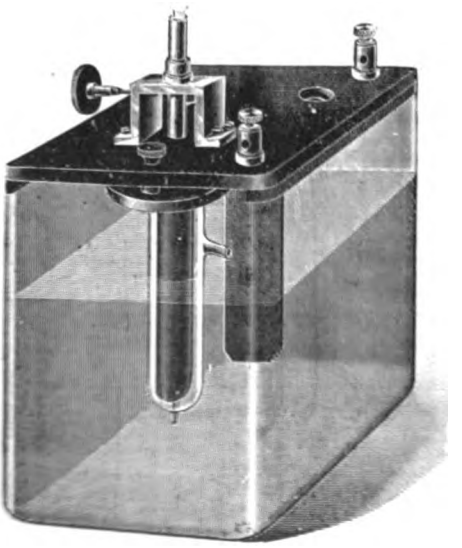

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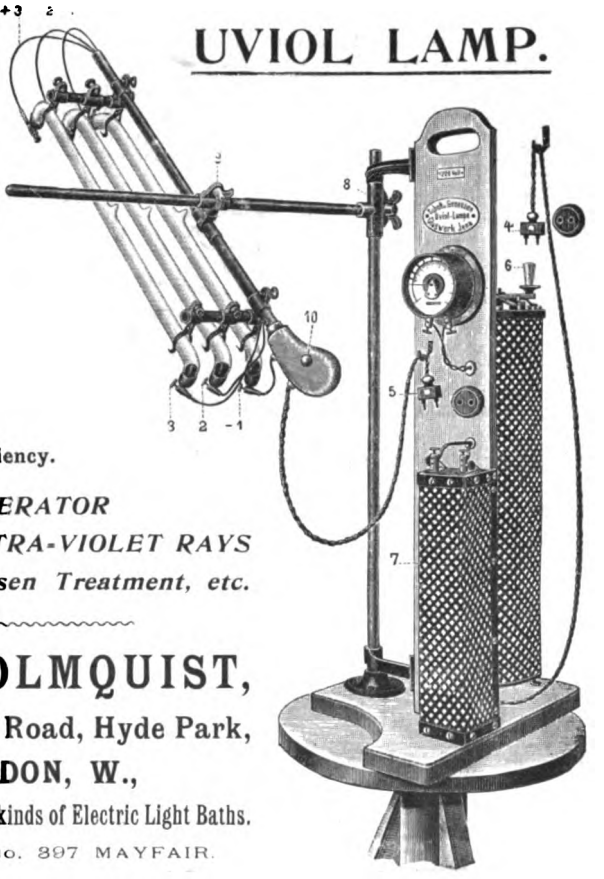

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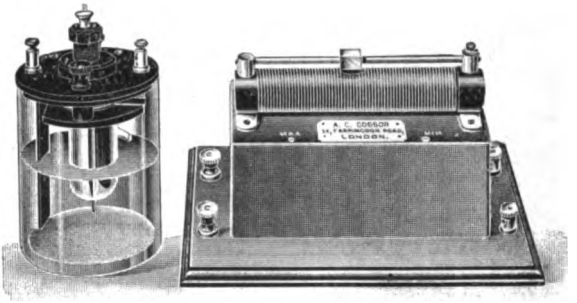

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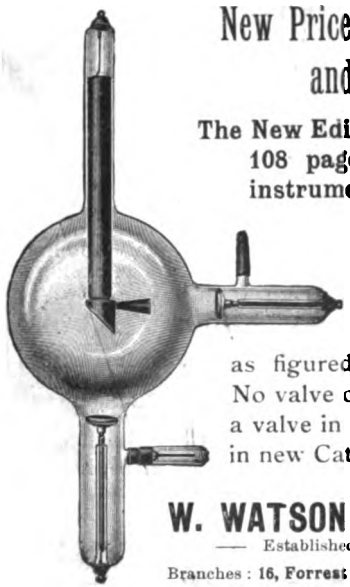

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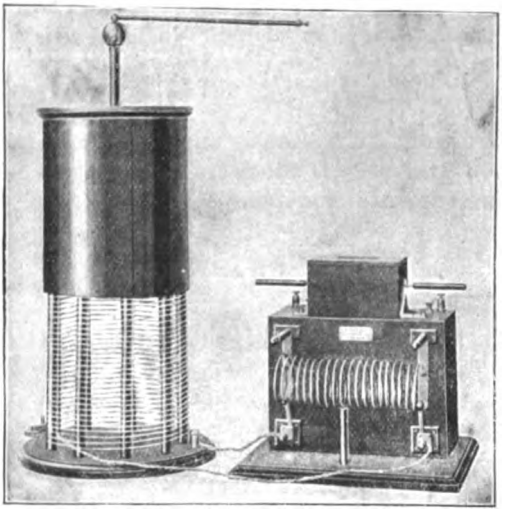

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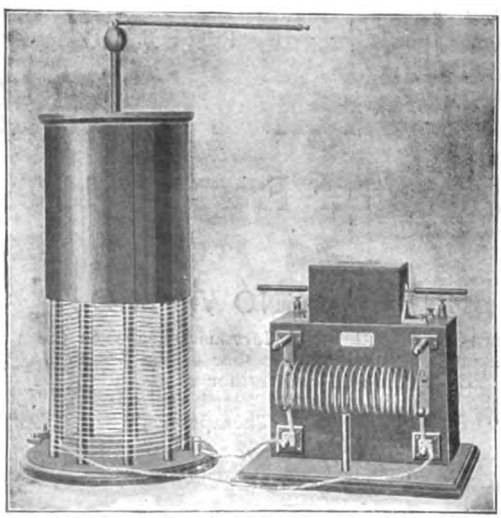

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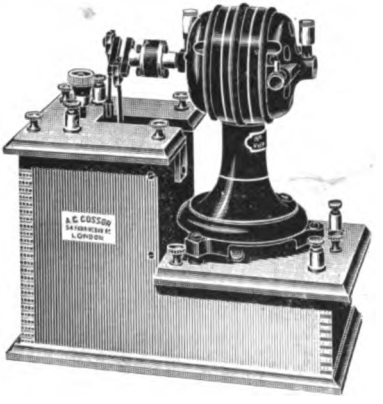

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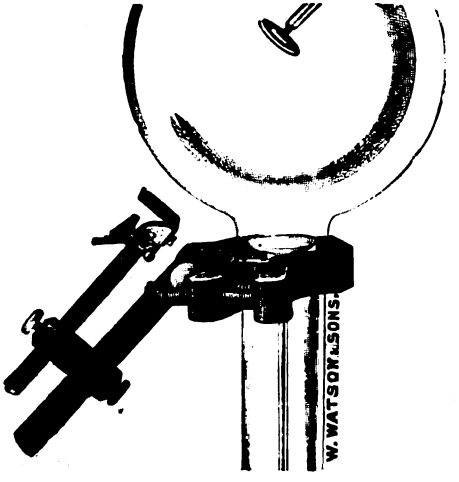

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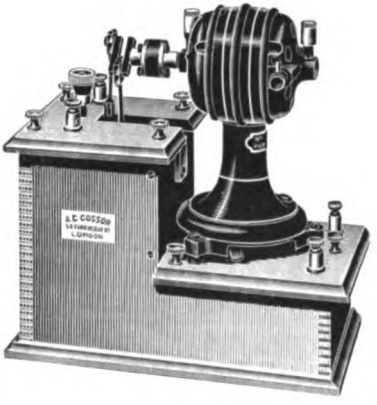

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Printed and Published, for the Röntgen Society, by Messrs. SMITH & EBBS, Ltd., Northumberland Alley, Fenchurch Street, London, E.C.

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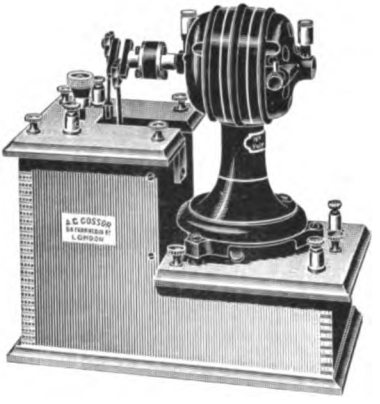

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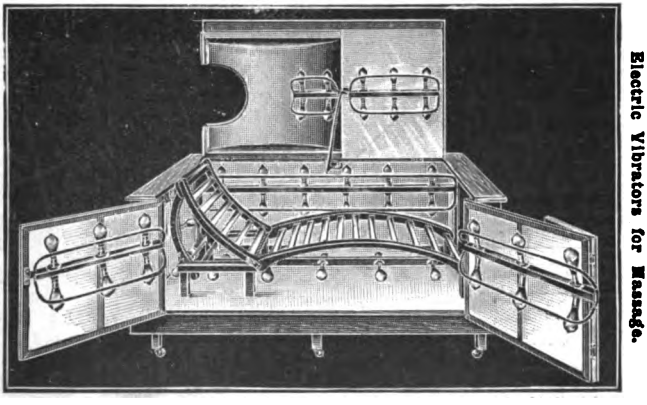

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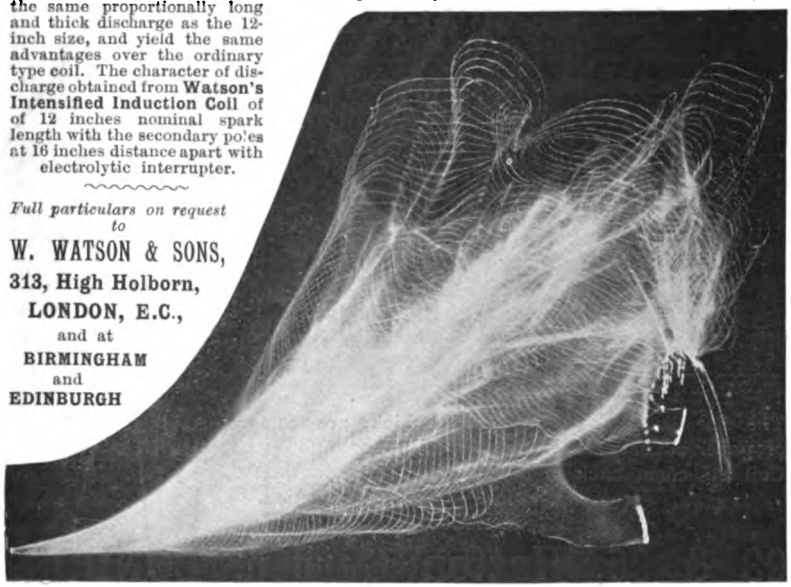

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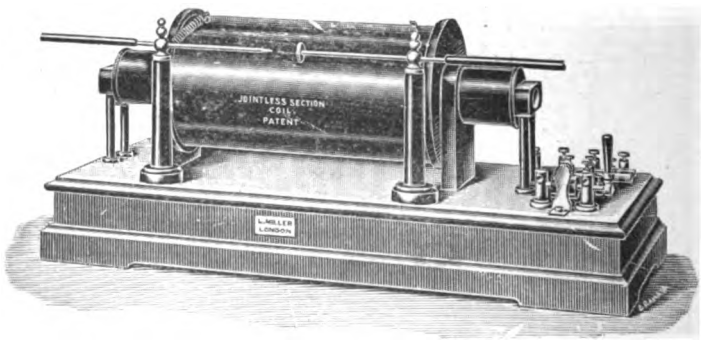

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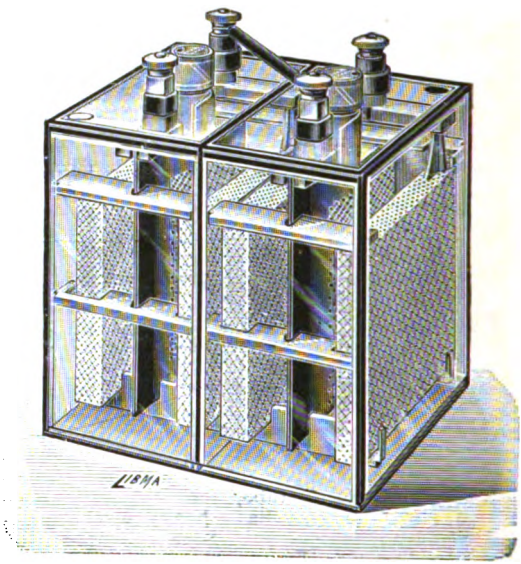

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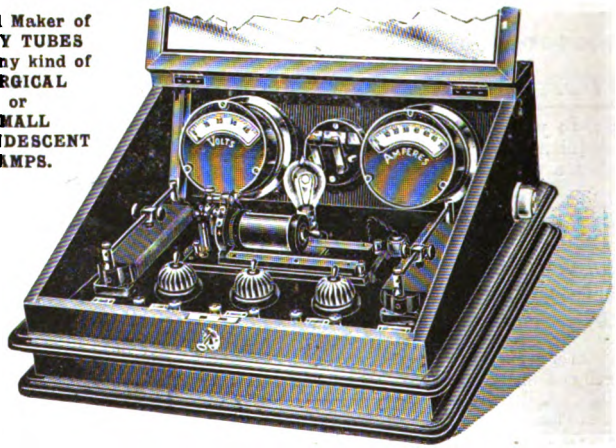

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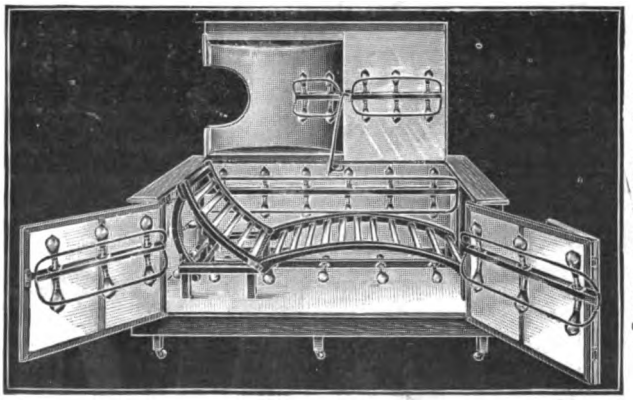

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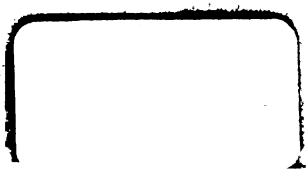

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